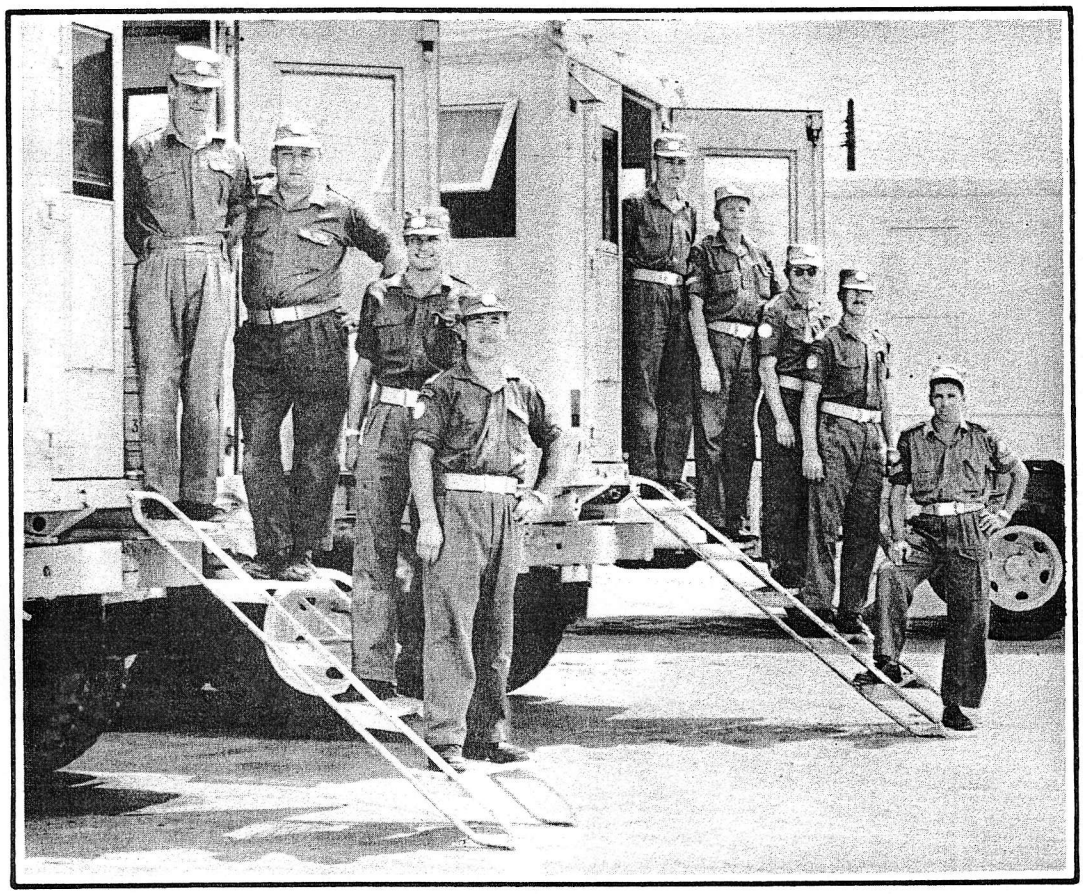
RCEME TECHNICAL BULLETIN



Vol 6 No 2 June 1961

RESTRICTED

DIRECTORATE OF ELECTRICAL AND MECHANICAL ENGINEERING

Dont Hide It
Pass It Along!

THE INSPECTOR RCEME SAYS:

"The Technical Bulletin is NOT getting to all ranks and civilians - too many copies are kept personally, hidden away".

THE EDITOR SAYS:

"This is NOT the intention. The contents are aimed at ALL trades and ALL ranks.

DO NOT BE A HOG - PASS THIS ALONG".

CORRECTION

In the February issue, the article entitled "The Mobility of a Field Workshop" was credited in error to Capt HW Chapman.

The author of the article was Capt P Bateson psc who is at present Staff Captain Q at HQ 1CIBG in Calgary.

We in the directorate who are responsible for editing such articles wish to express our sincere apologies to Capt Bateson for this error.

RCEME
TECHNICAL BULLETIN

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COVER: RCEME Inspection Teams in the UNEF.
See story on page 2.

Col KH McKibbin will be promoted to the rank of Brigadier in July. He will take up his new duties as Commander Western Ontario Area on 1 Sep 61.

Col McKibbin was born in Port Arthur and educated at The Royal Military College and Queen's University, Kingston, Ont. He was commissioned in RCOC in 1936 and in 1939 attended MC of S in the UK.

During the Second World War he was employed in senior technical and administrative posts in Canada and the Netherlands. He returned to Canada in 1946 to be Commandant of The RCEME School.

In Nov 1949 Col McKibbin was appointed to DMT, AHQ, Ottawa, and the following year he was promoted to his present rank and appointed Chairman of The Army Establishment Committee. Before going to Germany in 1958, Col McKibbin served as DQOP at AHQ.

INSPECTION AND LIAISON IN THE UNEF

By Lt EM Conway

Are your "Inspections" a routine grind? There is variety and interest to inspections carried out in the desert which prevents the routine from becoming monotonous. The inspection of UNEF technical equipment is most interesting because of the diverse equipments, the number of languages encountered, the various methods and systems of maintenance and unit repair and last (but not least) the variety of national customs, food and drinks encountered.

Our RCEME-staffed inspection teams encounter numerous technical problems and many minor procedural difficulties. The obvious questions such as "When will our vehicle be completed at the workshop; you know the one, we plan to send it in tomorrow?", through "Would you please inspect our vehicles because we would like to get some new ones", to "Could you please paint the CO's fridge, we have it all ready, but the Bedouins stole our paint gun last night", all lend considerable interest and some amusement to an otherwise dry job!

Technical equipment inspection teams of RCEME tradesmen carry out 'in situ' periodic inspections at the contingent camps of the seven different countries contributing forces to UNEF; Brazil, Canada, Denmark, India, Norway, Sweden and Yugoslavia. The Inspections and Liaison Section of the workshop operates under control of an officer, with a senior NCO in command of each of the two vehicle teams. Communications equipment are the responsibility of a radio mech cpl; other technical inspections personnel are borrowed from the Workshop Production Sections on an 'as required' basis. The various teams are supplied with shop van trucks modified for inspections and servicing section tasks, and equipped with hand tools, fast moving spares, and the various items required for vehicle and equipment inspections.

The job in the Sinai differs in many ways from similar inspection jobs in Canada. The greatest difference is in the quantity and diversity of equipments in the Force. When the Force arrived, in a situation of emergency, each contingent was equipped with vehicles and technical stores of national origin. The equipment of the Force, as a result, still represents a vast number of equipment types, makes, models, countries of origin and years of manufacture. To further complicate the situation, this array of technical equipment includes an endless variety of screw thread types, nut and bolt sizes, electrical characteristics and standard hardware items which are anything but standard. Inspection and maintenance must continue despite these difficulties and in spite of the various other problems (language, for instance) inherent in a Force of this heterogeneous composition. To illustrate the magnitude of the equipment diversity: the Force holding of vehicles is some 950, representing 137 different makes, models, types and countries of origin; the Force holding of generators (lighting plants) is some 315 units representing 52 makes, models, types, countries of origin and electrical characteristics. A similar situation exists in every field of technical equipment - weapons, instruments, office machinery, fire

extinguishers, communications equipments, and welfare stores (motion picture projectors, juke boxes, radios, sports stores and amenities equipment).

The purpose of inspections here, as elsewhere, is to ensure that maintenance, lubrication and unit repair is adequate; that condition classifications are recorded and notified to the Force Headquarters; and that units are assisted, where practicable, with their problems. The detection and correction of faulty driver practices, the detection of mechanical defects and faulty adjustments, and the minor repair of equipments are, of course, related missions of the inspection and servicing teams. Additional to the problems already outlined, the teams soon discover that the natural elements are arrayed against them. Sand is everywhere - in the gas, in the oil, in the working parts, in the projectors, in the instruments, in the generators, in your hair, in your eyes, and (only if you're an 'Old Timer') in your shoes! There is for most of the year a heavy nighttime atmospheric condensation of moisture vapour (commonly called 'dew') which causes no end of maintenance problems. There is the extreme heat of the desert summer sun which adds to engine cooling problems, and compounds lubrication problems. Even the terrain is a natural enemy, the patrol roads(?) of the Armistice Demarcation Line and the International Frontier exact their toll in wear and tear even on the military pattern vehicles and equipment.

The national policy of some of the contingents involves a rotation of personnel every six months. The recurrent problem of equipment familiarization is met, in part, by courses conducted through interpreters and held either at the unit's location or at the workshop. In addition to the equipment itself there is a requirement to explain inspection and repair procedures to each new contingent. The Force has evolved a weighty volume of Standing Operating Procedures and a fair collection of Technical Bulletins to serve as guides but, particularly when translated, these documents often require explanation and amplification. Courses for contingent logistics personnel and constant technical liaison with the units is an important aspect of the overall commitment. In the course of this close association with the various national contingents our travelling teams are exposed to a variety of national customs, religions, diets and dishes, drinks, working methods and operating procedures, all of which help to prevent the routine from becoming monotonous.

Service on an inspection team in the UNEF is a rewarding experience in many ways. Many of the national contingents are not composed of professional full-time soldiers. In many cases vehicles and equipments are fast wearing out. There is little that is standard among the national contingents in the way of tools, plant, equipment or working facilities. Many of the contingents operate on a decentralized basis, with company and platoon camps widely dispersed. The difficulties involved in inspections and servicing of technical equipments under these conditions provide a challenge which has been cheerfully and efficiently met by the Inspections and Liaison Section.

In addition to the personal satisfaction of having done a good job under adverse circumstances the RCEME personnel have made many warm friendships with soldiers of other national contingents. The teams have the gratifying feeling of having solved many minor problems. Possibly most important, to the individual, is the satisfaction that comes from the realization that the routine job has turned out to be a satisfying and educational experience and not a monotonous routine under adverse conditions at all!

By far the largest task is the inspection and servicing and repair of vehicles and normally all unit vehicles except those on outpost duty or in the workshop are covered.

With the equipment and personnel available, each unit in the force is visited once every six months as shown in the last inspection cycle as follows:-

Swedish Bn	- Gaza	- 6-23 Dec 60
Danor Bn	- Gaza	- 26 Dec 60 - 7 Jan 61
UNEF MP Coy	- Gaza & Rafah	- 9-11 Jan 61
56 Cdn Sig Sqn	- Gaza & Rafah	- 11-21 Jan 61
Brazil Bn	- Rafah	- 23 Jan - 11 Feb 61
Indian Bn	- Dir El Bala	- 14 Feb - 4 Mar 61
UNEF Engr Coy	- Rafah	- 6-18 Mar 61
Yugo Recce Bn	- El Arish	- 21 Mar - 8 Apr 61
115 ATU RCAF	- El Arish	- 10-15 Apr 61
Indian Sig Det	- El Arish	- 17-19 Apr 61
Cdn Recce Sqn	- Rafah	- 24 Apr - 6 May 61
Normed Hospital	- Rafah	- 8-9 May 61
56 Cdn Inf Wksp	- Rafah	- 10-19 May 61
UNEF Ord Coy	- Rafah	- 22 May - 3 Jun 61

Personnel of the teams, with vehicles, shown on our cover are, l to r: Sgt Munroe GR, Cfn Sproat JD, Cfn Ward MH, Cfn King SW, Cfn Buck JS, Cpl Murrell MG, Cfn Castor DJ, Cfn Gillis GE, Sgt Miller AM.

Sparks In The Middle East

By S sgt TW Baldwin

After being NCO ic the Electrical Section of 56 Canadian Infantry Workshop for the past seven months, I would like to give you some impressions which I have gained during this time.

In all my past experience in field workshops, both in and out of Canada, I have never seen more ideal conditions for a tradesman to gain the necessary experience he requires in the shortest possible time. The variety and peculiarity of the equipment plus the fact that parts present a problem at all times, causes the individual to improvise as well as to think while the job is in progress. Although basically all equipments are the same, each one is sufficiently different in detail to keep the tradesman happy and gainfully employed in his tasks at all times.

The backlog in the section consists of 50 per cent power generators and lighting plants of all makes and sizes, with the remainder made up mostly of automotive electric assemblies and appliances. In a location such as the Middle East power is never readily available, especially at the isolated outposts. Small generators designed for intermittent operation are required to run as long as 12 to 14 hours a day, with the result that maintenance and serviceability of these equipments is a never-ending task.

In the past two or three years these equipments were held mainly in the Vehicle Section for repairs, but with the present arrangement the equipments are the responsibility of the Electrical Section, where an increment of vehicle mechanics is attached for this purpose. This arrangement has proved to be a very satisfactory system for the repair of these equipments. The same results should exist by sending an electrician to vehicle section but for some reason or other this has never been the case.

Under the present arrangement both electrical and vehicle tradesmen work side by side and only the proper amount of leads are disconnected to allow the disassembly of the equipment concerned. In addition the knowledge is available to make the decision on the spot as to whether or not the equipment needs to be disassembled in the first place. Although the vehicle mechanic has a sound knowledge of engines, he now begins to understand the importance of correct rpm and the necessity of delivering maximum hp at constant speed for many hours of operation. Regardless of what component of the power generator has been changed however, the responsibility for the final tests and condition of the equipment rests with the electrical mechanic. In this present arrangement results have proved to be most satisfactory.

The 50 per cent of the backlog made up mostly of automotive assemblies, at first presented a number of problems. These problems were overcome by allotting an electrical mechanic permanently to

Vehicle Section. His responsibilities were not necessarily the repair of the equipment but the finding of faults and confirming the source of trouble. He would pass the information to the vehicle mechanic concerned who would then do the necessary repairs. In this way he becomes familiar with that part of the trade which he is required to know. All the components declared NS by the electrical mechanic are sent to RCOC and later returned to the Electrical Section in lots on 2149's for repair.

Experience in 56 Inf Wksp has shown that the centralized control of all electrical repairs has resulted in faster and more efficient service.

SOME FACTS

The Electrical Section of 56 Workshop consists of an electrical artificer s sgt, 1 cpl and 4 cfn electrical mechanics and a civilian electrician.

The power generators repaired are in the 1 and 18 KVA range and with over 300 in UNEF, the production is approximately 1 per day. The average backlog of 20 generators consists of 4 awaiting parts, 4 awaiting labour and 12 in progress.

In an average month the starters, generators, voltage regulators, fans, heaters, hospital equipment, etc, repaired number 125.

The Director being welcomed at El Arish Airport by Maj PA Tuck and a piper of the Canadian Base Units.

PURE ICE IN THE DESERT - BY THE TON

By WO 2 ('Ice Artificer') JM Cunningham

Variety is reported to be the spice of life. Although spices were usually sought in places much further East than Egypt, conditions have changed greatly since the days of the early travellers to India and Cathay. In so far as the RCEME workshop responsibilities are concerned, there is now plenty of 'spice' in Egypt.

Reference has been made in numerous earlier articles to the wide variety of work carried out by 56 Cdn Inf Wksp, RCEME, located at Rafah Camp. The opportunities for tradesmen to acquire additional trade knowledge and experience in many unfamiliar fields have been mentioned. One of the responsibilities which has not been mentioned is the operation and maintenance of the Camp Ice Plant. This plant is a gas-engine-powered unit of 1000 pounds capacity, and normally is capable of producing this amount of ice daily. The requirement to produce this ice locally is the result of the high standard of water purification enforced by the military authority; ice produced by civilian sources is made from water which has not been purified to military standards and is not potable. The operation of a military plant to produce potable ice is a necessity, by Western standards.

This freezing unit, a complete mystery to most workshop personnel at the time the responsibility was undertaken, has now become something much less than the maze of tubing, compressors and radiators that it formerly was. While operation and maintenance of the plant is a RCEME responsibility, refrigeration maintenance has been carried out by tradesmen employed by the UNEF Engineer Company. During the course of refrigeration repairs, personnel of the workshop (curious types!) have peered over shoulders and asked many questions - as many as were acceptable to the refrigeration expert. As a result many of the clouds have been dispelled from the refrigeration picture. The point has been reached where, upon occasion, repairs, evacuation of system, refilling and adjusting has been carried out by workshop personnel who previously had no contact with, or intimate knowledge of, refrigeration systems.

This venturing into unfamiliar fields of technical endeavour is as alluring to many tradesmen as is man's entry into space, because of the unknown and additional demands placed upon him. All too often tradesmen are hesitant to take on repair commitments beyond their normal spheres, and it is encouraging to see so many of the RCEME

personnel in all sections of the workshop delve into and successfully repair many items with which they had little or no previous experience. This opportunity is helping to develop a versatility urgently needed in workshops generally, and which is becoming more apparent with present day technical developments.

SOME FACTS ABOUT THE PLANT

The plant, which has been in the force for five years, is a US Army 1-ton skid-mounted machine manufactured by RECO Products Division of the Refrigeration Engineering Corporation, New York. It is powered by a locally-modified M 38 engine.

Cool air is drawn through the large duct at the rear and over the cooling coils by the compressor fan. The air then passes over the M 38 engine and through the radiator. The engine is exhausted through a flexible pipe which passes through and warms a 40-gal drum of water. The 50-lb ice containers when frozen are moved by an overhead pulley and partially immersed in the warm water to facilitate removal of the block of ice.

-ngths.

Psidium, owned by M. pad Plesch, is a chestnut col by Pardal out of Linarella.

Black Market In Ice Stirs Egyptians

CAIRO (AP) — Egyptian officials declared war today on black marketeers in ice as the temperature climbed to 111 degrees, one of the worst heat waves Cairo has ever experienced.

Ice almost disappeared from the market as black marketeers raised the price. A state of emergency was declared.

Home Delivery

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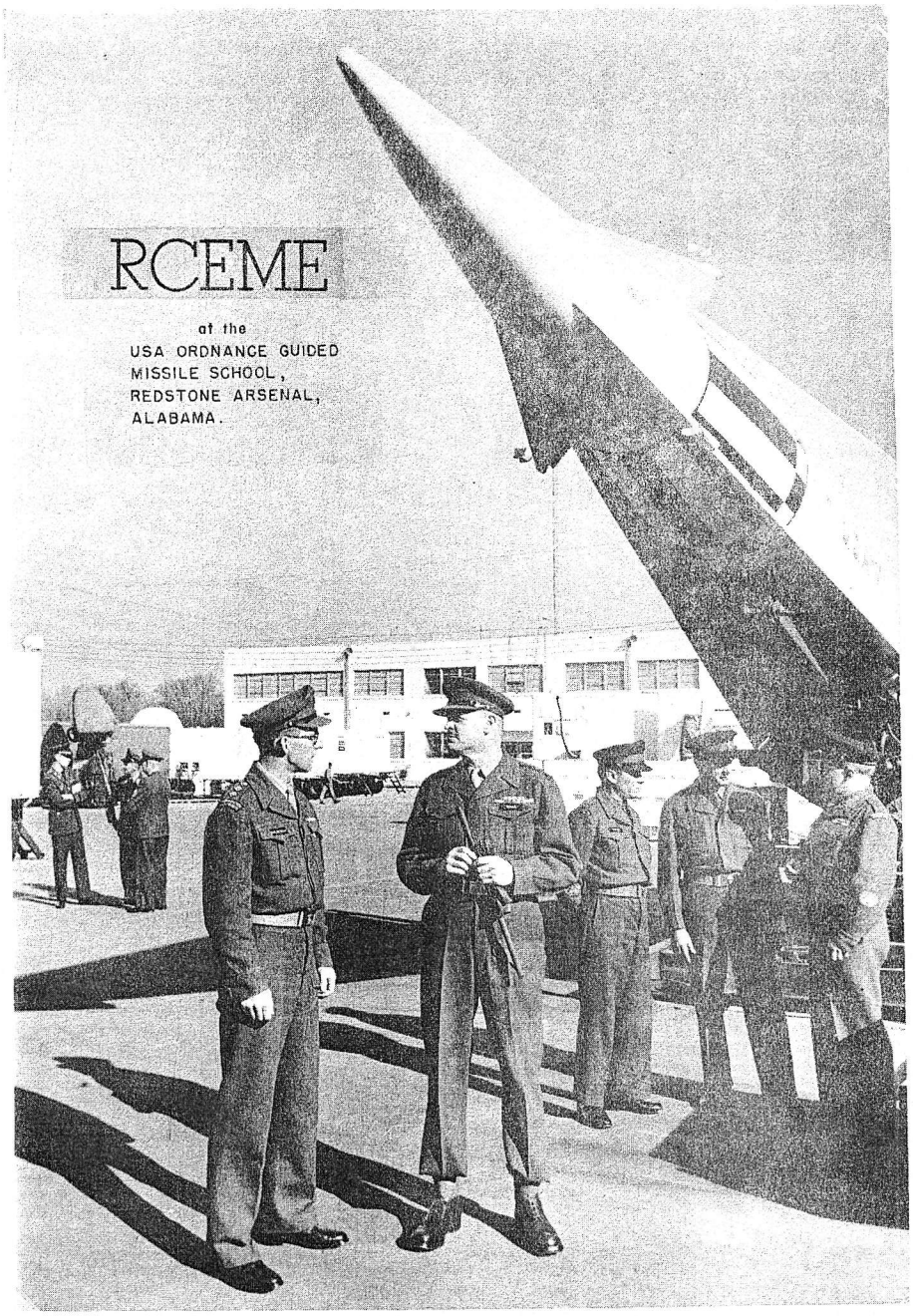
Ottawa Journal, 2 Jun 61

They should have called RCEME and got a 2149

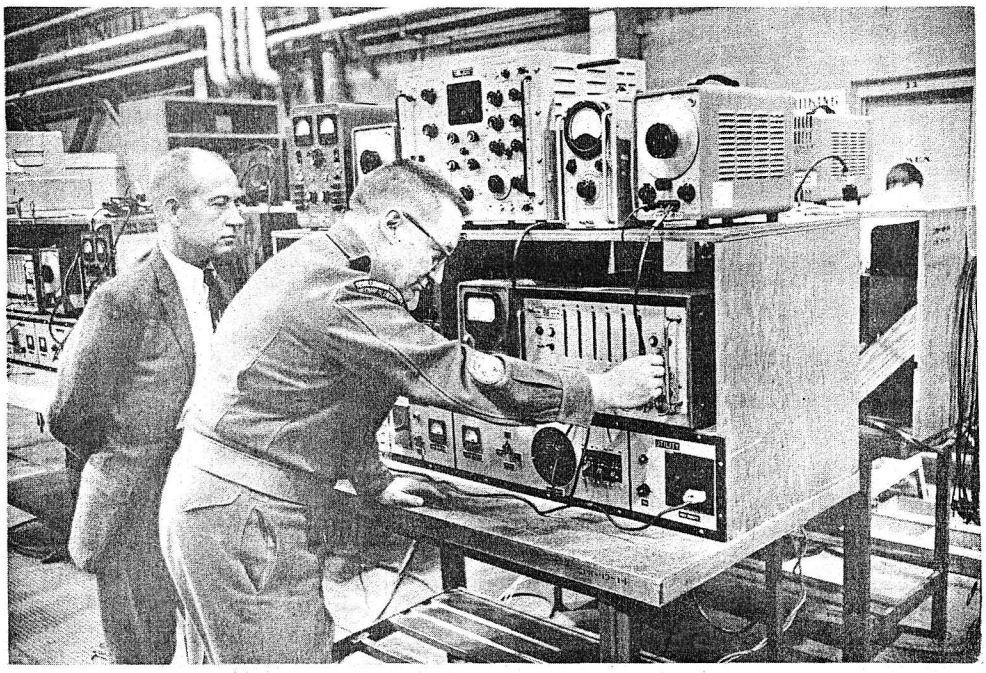


In the foreground, l to r: Capt RL McIntosh, assistant to the Canadian Liaison Officer; Maj GA Wood, RCA, the Canadian Liaison Officer; WOs 2 (now Lt) LM Harvey, GH Schleihauf, and GA Thomas.

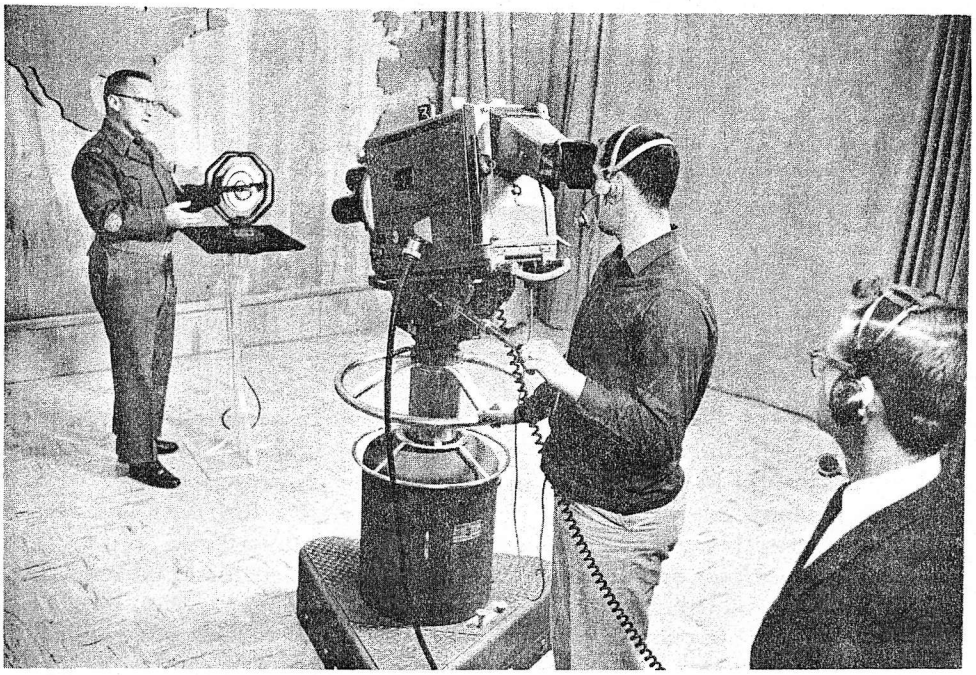
In April 59 Harvey and Thomas were appointed instructors in the Maintenance Supervision Section of the Hawk Missile Branch. WO 2 Schleihauf replaced Harvey in May 61. Thomas remained as an instructor in the Computor Section of the Field Artillery Missile Division, and will be replaced by another RCEME WO, CN Sochasky on completion of his instructional course.

(Photo credits to Black Star, New York; used through courtesy Toronto Star, and Public Information Office, USAOGM School, Redstone Arsenal, Alabama).

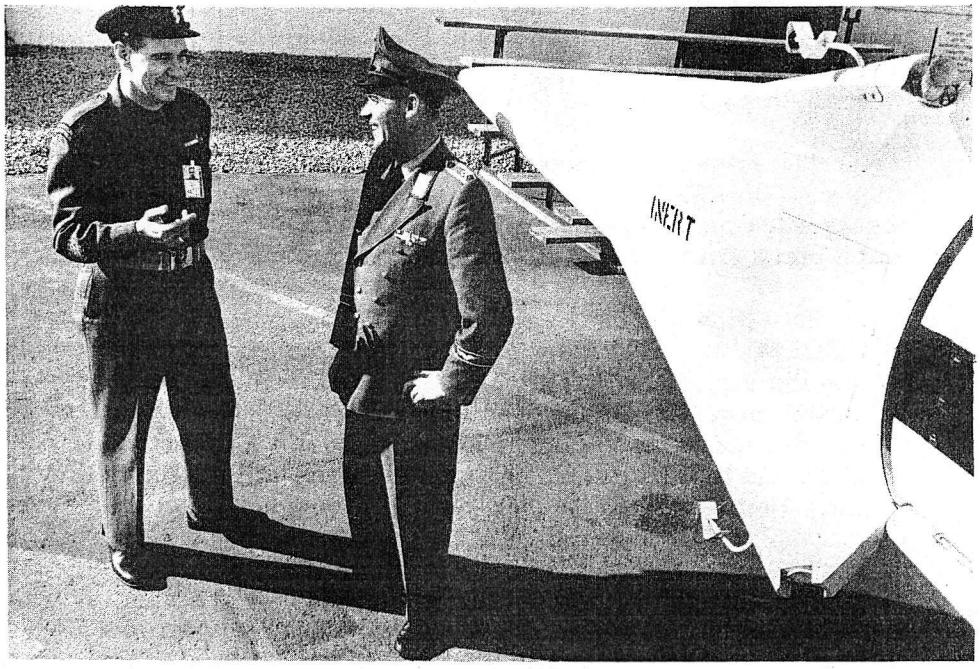
WO 2 LM Harvey instructing in missile maintenance.



WO 2 GA Thomas checking over some complex missile testing equipment with a US civilian teacher, WD Horton.



WO 2 GA Thomas explaining the functions of a gyroscope in missile guidance, before a closed circuit television camera.



WO 2 GH Schleihauf talking to a German student, Sgt Maj Hans Dreesen who was a Luftwaffe pilot shot down over Italy and interned in Canada.

As the title indicates this is an historical rather than a technical article. Its submission for publication is justified on the grounds that others might be interested in a departure from the routine. Perhaps, too, a seed may be planted that will grow into similar ventures in other commands to the benefit of our Corps. Continually having to operate with people one sees only occasionally, through the impersonal approach of letters and directives, has many disadvantages. There is little feedback without personal contact, and a wealth of talent and ideas that could be developed are lost. For this reason it was the aim of the Comd EME to bring all RCEME officers together at the first opportunity to discuss policy and problems of mutual interest.

With the restrictions on travel that exist today such an opportunity had to be made. This was not an insurmountable obstacle. All officers were enthusiastic and willing to pay for the opportunity. In return for their devotion to duty the conference was arranged to combine work with play. In this the Comd EME deserves many thanks for providing a well stocked cottage at St. Gilles, 25 miles south west of Quebec, for the informal meetings during the week-end.

The formal meetings were arranged for Friday 10 Mar in Quebec City with the CO 5 Coy RCEME acting as host. Included in the arrangements were lunch at Headquarters Eastern Quebec Area Officers' Mess and a mess dinner at the R 22eR Depot Officers' Mess in the Citadel.

Six officers from Headquarters RCEME Quebec Command and 4 Coy RCEME departed from Montreal for Quebec in two cars at 1400 hrs on the 9th. The 12 and 13 inches of snow that fell that day and the following morning had not been preplanned (at least not by RCEME). As the day moved on the snow gradually took its toll and finally even RCEME had to take cover. A friendly motel at Laurier Station approximately 20 miles from Quebec provided food, shelter and necessary mix.

Conference day dawned bright and clear. The highway was open and the Montreal group joined forces with the five officers of 5 Coy RCEME by 0900 hrs. Until coffee break officers paired off by appointments to tour 203 Wksp RCEME and to discuss problems of mutual interest. During the remainder of the day the following main subjects were covered in the conference agenda: EME Services by Civilian Contract, Militia Servicing Sections, RCEME Periodic Inspections, Scales Documents and Procedures, Effective Production Control, Workshop Inspections, Time Accounting and Activity Analysis.

A RCEME mess dinner for 14 officers at the Citadel! The R 22eR band in attendance! The Area Commander, the AA&QMG and mess PMC as guests! Need more be said? This was truly an event to be remembered and RCEME Quebec Command is indeed indebted to the CO and officers of the R 22eR Depot for making it possible.

A midnight snack chez Jeffrey had to be turned down by the Montreal group for the route to St. Gilles was fast drifting with snow. It was close. A later start would have made the difference and on this road there are few if any motels.

Within minutes of arriving at St. Gilles the fireplace was roaring and in the kitchen bacon and eggs were in the pan. Thus started the Saturday session. It was a long day. The Quebec Group arrived in the afternoon to join the fun and stayed late.

The hearty types made a trip in the woods by snowmobile before supper. The fan belt broke miles from home and unfortunately most of the antifreeze mixture boiled off before it was noticed. Like loyal subjects they strained their utmost and the refreshment they carried, (courtesy Molsons) was converted for use. A recovery in its purest sense.

Meanwhile back at the ranch the cooks were having water trouble too. The well went dry. Even after the meal they prepared had been sampled they still maintained they had met their emergency by melting snow.

Sunday was a day of rest - leisurely packing and breaking camp. Home stations were reached with all in high spirits if perhaps still a bit tired from the steady pace.

This was not the first Quebec Conference nor were the decisions made as important. But for those attending it will be as well remembered. Friendships were strengthened and decisions made concerning our sphere of operations which can be truthfully termed momentous. All fortunate enough to attend agree with the Area Commander who said during his address of welcome at the mess dinner "This type of gathering happens all too infrequently. Our task can only be easier as a result and I sincerely wish that it will become an annual event."

RCEME PLANNING

By Col RA Campbell

(From a lecture given by the Director to the Canadian Army Staff College, Kingston, on 10 May 61)

INTRODUCTION

As the management of war becomes more complex, so will the equipment used. If increased reliability is not built into this equipment, the maintenance overhead will rise. If an increase in lethality does not accompany this rise in maintenance overhead, then a formation of a given size will become weaker in fighting power.

The keys to low maintenance overhead are less equipment, simple equipment and increased reliability. Despite this we are engaged in a frantic struggle to make equipment more and more complex with little or no emphasis on reliability. Equipments now contain more parts or more tubes with no increased reliability and with perhaps a decrease. There are exceptions of course. I have yet to see the term reliability defined but it is suggested that it means assemblies and components with a predictable life rather than an equipment which will perform satisfactorily for a given period.

The number of equipments, particularly vehicles, is steadily increasing in each unit and formation and unless this is curbed, the maintenance overhead will eventually bankrupt us. As an example, the infantry battalion establishment of vehicles at the end of the Second World War was 136. Today it is 191. We may anticipate a substantial increase.

PRINCIPLES OF MAINTENANCE

Once an equipment has been acquired for service use the following seven Principles of Maintenance will govern the quality of the service RCEME can give with the lowest possible maintenance overhead. Commanders and staff officers should keep these in mind to get the most out of their RCEME support.

a. Maintenance overhead is directly proportional to the quantity and complexity of equipment.

b. Unit commanders must be assigned specific maintenance responsibilities and must command the personnel responsible for performing the work. To this end it is planned to disband LADs and make the unit maintenance personnel organic to units. In line with this it has been recommended that the bde gp LAD be disbanded and the tradesmen included in the infantry battalions and brigade group HQ establishments.

c. Repair can only be effected when skilled labour, tools and parts are all applied to the casualty at the same time. We control the first two but RCOC control the third and our service is therefore dependent

to a degree on another corps. Continued co-operation between the two corps is therefore vital in this area.

d. Rapid, accurate and complete diagnosis as far forward as possible will permit more rapid repair. Accurate diagnosis can only be done by our most experienced technicians and the Corps policy is that our best tradesmen will be with units. Field repair in the forward area is dependent on this diagnosis so that the mobile repair team will arrive with the proper assemblies.

e. Repairs must be carried out as far forward as possible in order to keep the maximum numbers of equipments operational.

f. The maintenance organization must be flexible in order to be capable of deployment to suit the tactical plan. The commander must never be hindered by a lack of equipment maintenance.

g. The maintenance system must be enforced by inspections, education and advice.

So much for the principles.

OPERATIONAL PLANNING

Use of a Forward Repair Platoon

The workshop establishment as presently constituted has contained a forward repair platoon and it will soon be an integral part of the new workshop establishment. This change was necessary to provide a forward repair element consisting of specialized mobile repair teams capable of performing in situ field repairs, thus avoiding loss of time out of action for essential operational equipments. This platoon is designed to carry out repairs to tracked and wheeled vehicles, and weapons. This system has been tried in Europe and in Canada for the past two years and results have proven the need for this type of organization.

Introduction of Aircraft Platoon

A current and interesting change has taken place with the introduction into the Army of fixed and rotary wing aircraft. It has been necessary therefore to include an aircraft repair "increment" in the field workshop in Germany and a restricted "increment" in the field workshop in Canada. New planning establishments for servicing and repair have been approved and RCEME airplane technicians are already on the job in Germany, Rivers, Shilo and Petawawa. Other personnel are trained or are being trained to enable the corps to provide the necessary tradesmen as the procurement of aircraft accelerates. Personnel are available to support the helicopters being procured including those for 4 Bde in Germany.

Refitting Units After Combat

When a battalion or even a company group has been so worn down in action that it must be taken out of battle, it will be replaced by a fresh one. The depleted unit will be relocated somewhere in the rear of the Battle Area. Although such a unit will be exhausted and will have suffered casualties in both men and equipment, it will not be completely ineffective. It will still be strong enough to lend depth to the deployment and help to protect the rear areas. Every effort will be made by the workshop to restore the equipment to operational condition. It is estimated that refitting a battalion or company group will take from three to five days and work will continue around the clock to accomplish this.

Use of Cannibalization

Cannibalization will likely be used on an unprecedented scale in future wars and a large maintenance float of equipment will be required unless reliability and ease of maintenance of our equipment are greatly improved. A very responsive spare parts supply system will also be required because everything needed cannot always be carried. In the forward area particularly, damaged equipment will frequently be stripped of usable parts and assemblies to restore the rest of the equipment to operational condition. Cannibalization will be extremely difficult to control and the solution will be a command responsibility.

Backloading Problems

The mobile battle fought over a wide area of ground, and the great distance separating workshops from the Battle Area, change the system of repair from that we employed in the Second World War and Korea. It is no longer practicable to backload large numbers of vehicles or equipments to workshops in rear. Large backloading points will present lucrative targets because they cannot be concealed. Medium workshops will be immediately in the rear of divisions to give intimate and rapid support by repairing the casualties beyond the capacity of the field workshop. No doctrine has yet been developed for medium workshops but perhaps AWDs will go forward to back up the forward shops.

Base Workshops

Base workshops in a theatre will also present too lucrative a target and will not likely be established because equipment will stay forward. Equipment will be repaired, cannibalized or destroyed. This also makes it mandatory to keep the equipment issued to units to the minimum.

UN PLANNING

Egypt

During 1956 Canada volunteered support to the UN force in Egypt.

56 Infantry Workshop was organized and despatched. Its functions were to assist with unit repairs for units of the UNEF less infantry battalions, and field repairs for all units of the UNEF. The workshop has continued to serve there to date but has become static and is employing a number of civilians and is doing a good deal of work by civilian contract.

Congo

At this time there is no indication of a RCEME organization being established in the Congo. Because of the wide dispersal of vehicles and because they are confined to three specific types sent to the Congo, the force can use local civilian firms for recovery and repair. In time, maintenance may become a problem there but to date there has been no need to establish a military maintenance organization because of the static and wide spread nature of the RC Sigs operation.

Other UN Commitments

It is quite conceivable (in fact it is more than likely) that we shall receive additional UN commitments, but what these will be we do not know. The Corps is ready however to organize and despatch on short notice a maintenance organization to support anything from helicopters to radios.

NATIONAL SURVIVAL

Role of RCEME

The issue of large quantities of radiation detection equipment on a national basis indicates a new RCEME servicing and repair responsibility which will require a number of highly trained technicians. A limited number of tradesmen are ready now for this task and when detailed policy is known, adjustments to the number of technicians to be trained will be made. The remainder of the maintenance task will be straightforward

Use of Militia

It is planned that RCEME recovery platoons will be used in the re-entry role. A number of recovery platoons are planned of which about 40 per cent will be regular force personnel and the remainder will be militia personnel. This new role will tend to restrict the number of militia trades with a probable decrease in interest in the RCEME Militia. Static shops will back up these recovery platoons.

OTHER PLANNING

Trials

User/operator maintenance trials are being carried out in Europe in the major units of 4 Bde. The trials are designed to train driver/

operators to take on a share of maintenance of vehicles which it is hoped will reduce the maintenance overhead and the number of RCEME tradesmen required. This system will be extended eventually to some other equipments and permissive repair schedules will in future contain details of the operator's maintenance responsibilities. This of course means that unit officers and NCOs will have to know more about maintenance problems.

Mobilization

Over a period of years the ratio of military to civilian workers in our static workshop organization has become unbalanced and in some establishments insufficient military personnel exist. In event of mobilization, this shortage of military personnel will create serious problems. Efforts are being made to secure a higher percentage of soldiers in static establishments so that we can effectively support field units on mobilization and still maintain an adequate level of military supervisory personnel in the static organization.

Design

Authority has been obtained to allow 202 Base Workshop RCEME to organize a design section employing Corps engineers who will be responsible for the design and production of kits for the new Bobcats. The loss of young engineers from the Corps because of the lack of engineering employment is seen as a problem which this new design section will help to overcome. A few of the kits to be designed are:

Carrier Personnel Full Tracked
Launcher Anti-Tank Guided Missile
Teletypewriter Message Centre
Self-Propelled 81mm Mortar
Repair and Recovery Vehicle

There are 18 kits planned at the present time.

EFFECT OF NEW TECHNIQUES ON RCEME PLANNING

Use of Automatic Data Processing (ADPS)

As a result of a recent introduction of new workshop procedures and the application of the ADPS to certain workshop control documents, we are now able to apply production yardsticks to determine the personnel required for any given repair task. We use yardsticks to calculate the requirement for RCEME personnel. These yardsticks are related to the quantity and type of equipments to be maintained. The yardsticks, in use at the present time, are based on current experience and have been confirmed by DRB and approved by the WEC. It is interesting to note that it will take one tradesman to maintain the following equipments for unit repairs only:

Three Bobcats
Ten 1/4 ton trucks
Fifteen 3/4 ton trucks
Seven 2 1/2 ton trucks
Five 5 ton trucks

During your careers as officers it may be useful to know that with the introduction of new equipments, logistical support manpower requirements change, making additions and in some cases deletions of trades positions possible. This factor must be considered in forward planning of Q functions. A case in point is the introduction of rotary and fixed wing aircraft for army use. ADPS may also have an application in the supply of spare parts in the field and this must be fully investigated.

Management

In keeping with forward planning, our Corps, realizing the rewards in efficiency and manpower savings resulting from good management, has introduced management training courses for officers and NCOs at the Corps School. Increased repair efficiency has become evident and we hope to give even better service in the future.

Use of Helicopters by RCEME

With the introduction of helicopters for army use the possibility of recovery and backloading by heavy lift helicopters will be investigated. Just picture the number of recovery tasks a helicopter could perform in the time required to backload one truck 75 miles at night using conventional wreckers. This field must be fully explored. In addition, parts urgently required in the forward area will have to be delivered by helicopter.

Ease of Maintenance Characteristics

Increased complexity in new equipments demands a higher manpower bill for maintenance. To avoid this, new equipments must be designed with ease of maintenance characteristics built into the equipment plus increased reliability. RCEME has been assigned this responsibility but because we design very little and buy most of our equipment from other countries this will probably be never fully exploited.

Reliability Studies

New weapons tend to be unreliable because of their complexity, greater power, the requirement for increased safety devices, and a tendency toward electrical and electronic controls. All these increase the incidence of failure. The high cost of testing prototypes and the smaller numbers of equipments produced, introduces special problems of production and inspection. Studies to improve reliability are being carried out and this subject is receiving considerable attention in both the USA and UK. Improved reliability will in turn reduce maintenance

overhead costs to a degree, but the big advantage to be gained will be in replacing components and assemblies before they fail so that equipment can be kept in action.

Introduction of New Equipment

The following new equipments have been or will be introduced into the army and will have a considerable effect on RCEME. They are:

Bobcats
Light Aircraft and Helicopters
Distance Measuring Set (Tellurometer)
Surveillance Radars
Counter Mortar Radar
Honest John Launchers

A study recently completed indicates an increase in RCEME maintenance personnel will be required in both static and field units to carry out maintenance on these new equipments. This is a case in point where, by the application of yardsticks referred to earlier, the manpower requirement to maintain new equipment can be determined. The training of specialists is already under way. Tradesmen are now trained and in position to service these new equipments although they have not yet been issued to user units. It is the hope that we will be able to continue this practice for the other equipments. As a matter of interest we have a nucleus of personnel trained on repair of most US missile systems.

CONCLUSION

The Corps will strive for speedy repair with the lowest possible overhead but the continual increase in equipment holdings is bound to increase the maintenance overhead unless a higher degree of reliability is built into the equipment. The reliability factor of any new equipment should be studied and carefully weighed before new types of equipment are purchased. Staff officers particularly in AHQ can help materially here.

We will have to pay a price for increased mobility both when APCs are introduced and again when helicopters are introduced. Remember the Bobcat takes 5 times as much maintenance effort as the 3/4 ton truck at the unit level. Maintenance will take on increasing importance and all officers will have to know a great deal more about it.

Military characteristics must not be written any more rigidly than absolutely necessary because any increase in performance demanded of equipment will almost invariably increase the maintenance overhead. Staff officers can contribute a great deal here by an intelligent assessment of requirements and a realistic statement of results to be achieved.

TECHNICAL NOTES

ELECTRICAL

NEW TEST EQUIPMENT

Within the last few months, three new items of test equipment have been issued to the field in quantity. These are:

6625-21-104-4814 Oscilloscope OS-8D/u

6625-21-106-2022 Multimeter 1 mv to 300 v

6625-21-108-2504 Wattmeter AF, ME 5006A/u.

Communications from the field indicate that these equipments may not have been up to specifications when received or that premature failures are occurring. It is therefore essential that EFRs are submitted on any abnormal failures.

TEST SET ELECTRON TUBE TV7C/U

Reports received from the RCN and RCAF indicate that the test data contained in TB-11-5083-1 may be incorrect for many tube types.

This equipment is now under study on the tri-service level. In order that Army, as the Design Authority, may table user comments, information is required from the field, particularly in regard to tube types on which test data appears erroneous.

In view of the questionable test data no action is being taken to procure and issue amendments to the TB.

MULTIMETER ME-77A/U

This equipment, a tri-service standard, has had some adverse comments, particularly from the other services. It would be appreciated if comments regarding form factor, accuracy, number of scales, separate current shunt and general suitability as a non-electronic multimeter could be forwarded to DEME.

RADIO SET C42; TEST HARNESS AND SPECIAL TOOLS

202 Base Workshop RCEME Maintenance Techniques Section have completed a project to develop and prove a set of test harness and special tools which will greatly facilitate inspection and repair of the C42 and its power supply unit.

Action is presently being taken to authorize entitlement of this test harness for all static and field workshops tels sections. It is hoped that they will be available for issue late this year.

In addition to the above, authority is being requested to provide each workshop with a Radio Set C42, basic set. This basic set will be used:

a. As a means of repairing sub-chassis of C42 by substitution.

b. To provide input voltages for C42 under test or repair.

c. To provide a proper load for the C42 power supply under test or repair.

Eventually it is planned to procure jig testers for the repair of sub-chassis. These will provide all necessary input voltage and signals to sub-chassis, permitting their inspection and repair without having to use the substitution method. These jig testers are still under development and will not be available for at least another year.

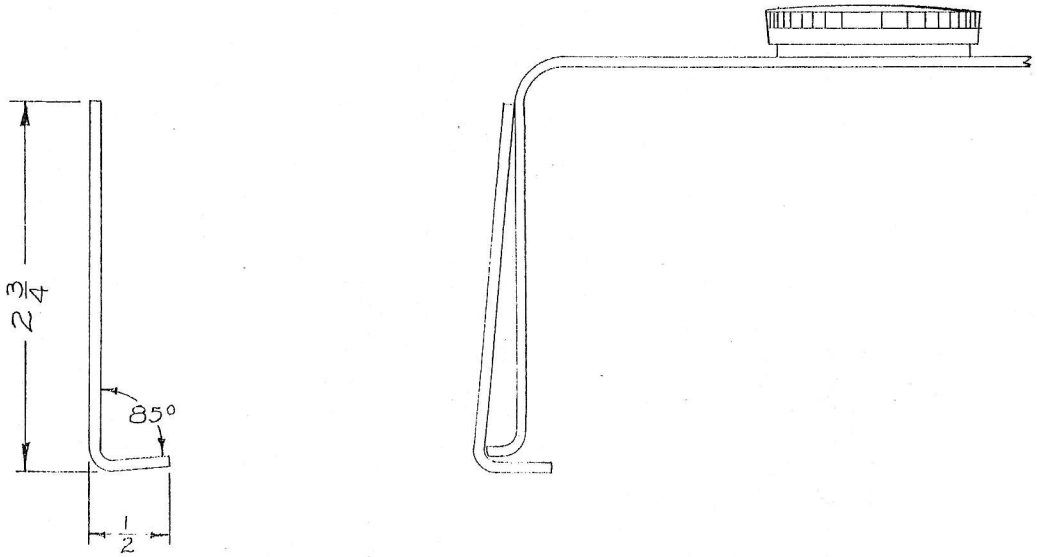
VEHICLES

HIGH TENSION VEHICLE WIRE

High tension vehicle wire is available under Ord MPC as "6145-00-001-3018, Wire, Electric, Insulated, std". When the wiring in SMP vehicles becomes defective, and the conduit is still serviceable, the assembly can be repaired by re-wiring at a considerable saving over replacing the assembly.

SMP 3/4 TON RADIATOR DAMAGE

It is reported that damage is being caused to 3/4-ton SMP radiator header tanks by the hood catch when the hoods are closed too vigorously. When this occurs the following repair is suggested. A piece of sheet metal about 18 gauge 3 in x 2 3/4 in is bent as illustrated and soldered (or cemented with epoxy resin) to the header tank, centered over the point of impact.



BROOMWADE AIR COMPRESSOR MODEL WR280M

An inspection of Broomwade Compressors shows that the floor sections adjacent to the radiator are rusting badly; this is caused by the lack of drain holes in these sections.

If rusting is noted on any of these equipments, drill 1/2-in holes at the lowest points of the floor sections to allow water drainage.

Badly rusted floor sections should be cleaned and painted.

AVIATION EQUIPMENT

EME MANUAL INSTRUCTIONS

The distribution of EME Manual instructions on Aviation Equipment is limited to those units having a direct responsibility for aircraft maintenance and repair.

Distribution is arranged by DEME as the need arises. Indents will not be submitted until after an initial distribution has been arranged.

WEAPONS

RIFLE 7.62MM FN (C1)

A new mark of rifle will be an issue in the near future and will be known as the (C1)A1. The main differences are a two-piece firing pin, new firing pin spring, reduced diameter of firing pin and firing pin hole in the breech block. The diameter of the bore is increased to 2.985 at the muzzle. A new design of carrying handle which is plastic will be fitted. In addition to the above, the extractor and barrel have been modified to prevent damage caused by the extractor hitting the face of the breech. New flash eliminator washers have been introduced to facilitate assembly of the flash eliminator. They are identified by the numbers 1A, 2A, 3A, etc, stamped on them.

RIFLE 7.62MM FN (C1 and C2)

The marking of numbers on breech blocks and carriers was authorized to be carried out in some non-permanent manner to provide an identity and permit these components to be maintained with their respective weapons.

It was generally left to Command resources to effect the marking. In this regard, a suggested method was received which has been used with some success. This method consists of numbering the components with a china marking pencil on the selected surface and applying any of the existing "Instant Gun Bluing" solutions over the number. The wax prevents the solution from etching the metal and leaves a clearly defined number against the black background.

TURBOCHARGERS

OPERATING PRECAUTIONS

The Canadian Army is now getting equipments which have turbocharged engines; for example, IHC trucks with Rolls-Royce diesel engines and Michigan Scoop Loaders. These turbochargers are expensive and delicate; they must be properly handled. Where equipments with turbocharged engines are held this information should be brought to the attention of the unit to ensure proper driver training.

Experience has shown that at least 80 per cent of all truck turbocharger failures can be traced to careless lubrication techniques during oil changes. Another 15 per cent of failures result from damage done by 'hot stops' and the remainder from running the turbo too hot.

Lack of lubrication has been found to be a probable source of trouble due to the delay in getting oil through the turbocharger bearings following a normal oil and filter change. On tight equipment a time lag of as much as 70 seconds has been noted.

Observations have shown that blower bearings will probably be damaged if the engine is run as little as two minutes without full lubrication to the blower. But the problem is actually worse than this. The normal practice of servicemen as well as drivers is to rev the engine after an oil change to bring oil pressure up a little quicker. When you rev a turbocharged engine, however, blower speed increases tremendously and this increases the damage to the blower bearings.

Another danger for the turbocharger is when the driver shuts down his engine while it's still very hot. When coming to a stop after a long high-speed run temperatures inside the engine (although the water temperature gauge won't show it) are very high in the cylinders, piston heads, valves and the turbo wheel. On the road, these temperatures have been held within allowable limits by the circulation in the cooling system and high air flow past the engine. If shut down while hot, the engine parts will retain the high local temperatures and will result in uneven cooling of the various parts.

The uneven cooling of a very hot turbocharger weakens and loosens the housing studs and can cause a distortion of shafts and blades. Troubles usually show up initially in fumes and leaks, turbo inefficiency and, eventually, bearing failure.

After a heavy run the engine should never be shut down immediately, but allowed to cool gradually at a fast idle for several minutes.

A GOOD MOTTO

WHEN SHE'S HOT, LET'ER COOL GRADUALLY.

NEW COURSES FOR 1961-62 TRAINING YEAR

By Capt JR O'Neill

The aim of this article is to outline a number of new courses that will be conducted at RCEME School in the 1961-62 training year. Details will be included in the Canadian Army Manual of Courses.

These new courses are designed to meet specific requirements. The decision to run a special course is based on one or more of the following factors:

a. New equipment being introduced.

b. The number of equipments being introduced.

c. The need for special training to provide immediate support to user units.

d. The number of tradesmen required to maintain the equipment at each level of repair.

e. Standardized training required of special equipment.

f. New procedures and techniques being introduced.

Selection of candidates for the initial serial of a course is usually made by Army Headquarters and based on the need for immediate support. Selection for subsequent serials will be based on Commands' requests.

RCEME 14 - Workshop Control Procedure

Some RCEME workshops have had difficulty in following the procedures detailed in EME Manual Static Operations K 010. Others have had to adopt certain procedures to suit local circumstances.

This course is designed to allow the presentation of problems and suggestions and to train control officers to effectively control work into and through a workshop while still providing the best possible service to user units.

This course will cover such subjects as unit action, completion of requests, priorities, repair limitations, workshop loading, control numbers and codes, progression of work, parts ordering and hastening, control of labour, backloading, civilian contracts, workshop repair section procedure, time accounting, analysis of daily and monthly reports and duties of workshop control office personnel.

This course is for RCEME junior officers and warrant officers who are employed or recommended for employment as RCEME workshop control officers.

RCEME 115 - Tellurometer Equipment Course

This course is to train Radar or Fire Control System Technicians in unit and field repairs to the Tellurometer AN/TRQ-19, so that immediate support can be given to the user units. Training on this equipment will be included in future radar trade courses.

The subjects cover the theory of measurement, description and function of circuits, introduction to tellurometer test equipment, specification testing, scope of unit and field repairs, exercise in fault finding and repair, repair problems, user operations and equipment issue scales.

RCEME 127 - Bendix Ignition Analyzer

During the 1960 inspections by Inspector RCEME, it was noted that vehicle tradesmen were not using the Bendix Ignition Analyzer to test vehicles for mechanical and electrical faults because senior tradesmen were not familiar with the operation of the analyzer or the interpretation of the fault display patterns. Therefore this course is being run to train Vehicle Mechanics Tracked Group 3A, Vehicle Mechanics Wheeled Group 3A and Vehicle Artificers, to operate the Bendix Ignition Analyzer on all types of vehicles using a high tension magneto or battery-operated ignition system.

It covers the methods of connecting the instrument to the various types of ignition systems, operation and function of the various controls of the analyzer; the theory of voltage variations in the ignition circuits of internal combustion engines; and the interpretations of their patterns as displayed on the oscilloscope.

RCEME 148 - Radar Set AN/PPS-4

This course is being run to train enough personnel in the repair of the Radar Set AN/PPS-4 so that immediate support can be provided to user units, and to create a nucleus of trained personnel who could in-job train others. It is expected that this radar set will be included in future courses in the radar trades.

The scope of this course will cover transistor theory and transistorized circuits, special repair techniques peculiar to transistor printed and wired circuits, the theory of Radar AN/PPS-4 circuits, test procedures, practice in the use of special test equipment and exercises in fault finding.

RCEME 153 - Equipment Decontamination

This course is similar to, and takes the place of, the RCEME Radiation Safety Officers course. The purpose of the course is to train RCEME officers and warrant officers in equipment decontamination techniques. The qualification of Radiation Safety Officer is granted on completion of the course.

(concluded on page 28)

PREPARE NOW FOR YOUR ANNUAL HISTORICAL REPORT

Lt-Col RH Hodgson

Each January, some of our newly appointed commanders discover to their horror that they must submit a report on the day to day activities of their unit for the past year.

I met this annual emergency with a clear conscience, suggesting to my chief clerk that he remove the Orders from the Part I and II Order Boards containing such historical items as our choice of fire piquet for the night of the 10 May and D Pers RCEME's selection of reinforcements that I assigned to the vehicle shop on the 17 August and to forward these valuable papers as our report.

PD Ouspenski suggested that life can be simplified as a point of view with many of our actions guided by the vantage point in time and space in which we happen to be. From my vantage point today, I am chagrined to realize that the Army Historical Section were not and are not interested in our choice of fire piquet for the night of 10 May unless he burned himself on the mess hall stove while getting his midnight coffee, nor were they interested in our assignment of reinforcements to the vehicle shop unless they were responsible for the increased production we bragged about in our end of the month reports.

The war diaries of The Second World War for the most part reflect the "Joe-job" attitude of their authors. Regrettably this reflection appears in today's historical reports.

War diarists were required to record the daily weather. Some diaries do just that and poorly too. Their successors are required to record the nominal roll of officers. Some reports consist of this and of little else.

What does the Historical Section want to find in your historical report?

The answer is easy to say but difficult to do.

They want factual word pictures of every interesting activity of your unit — from visitors, who they are and why they were there; special recovery jobs within the Service and at the request of Civil Authority; all aspects of training; production problems and their solution and accident reports — to an edited edition of your Part I orders.

The Historical Section is requested to search unit war diaries or historical reports on the average of once a week for a mention of an accident to a veteran.

You may well ask "Why?"

The answer is simple.

The record is as good as lost if the accident was not recorded on the veteran's medical file. Old accident reports are difficult to locate for they may be filed under one of many headings. Also, the veteran may not be able to recall the exact year or perhaps his unit when injured. In such cases the investigators turn to the Historical Section as a last resort. It is gratifying to assist a veteran to establish proof of injury who up to now was unable to establish his rightful claim for a pension for lack of evidence.

I am told by the Historical Section that 204 Base Workshop, closely followed by 202, submit the best historical reports in The Corps. I won't embarrass any of you by saying who submits the worst. You know where you stand if you submit a nil return or just complete paragraphs one to five of Appendix A to CAO 242-5.

Colonel CP Stacey, when Director of the Historical Section, wrote "War Diaries, Good, Bad and Indifferent" for the Canadian Army Journal in 1950. His remarks are brought up to date by substituting Annual Historical Report for War Diary.

"The War Diary, to a very large extent, in fact, reflects the efficiency of the unit. Broadly speaking, a good unit kept a good diary. I should not like to say that this was invariably the case; there were certainly instances of good fighting regiments whose diaries were not adequate records of their deeds, (the tragedy is that these units, thanks to this neglect, may never receive full justice for their achievements), but I think I can say with considerable confidence that a really bad unit never kept a good diary."

Prepare now for your annual historical report.

Read CAO 242-5.

Appoint an officer today to record the day to day activities of your unit in a 'Day-Book'.

Make your next historical report the best in The Corps.

NEW COURSES (continued from page 26)

This is a two-week course consisting of approximately one week at RCEME School and one week at the Atomic Energy of Canada, Limited, plant at Chalk River, Ont. The course covers a review of nuclear physics, radiation calculations and tolerances, testing and repair of radiac instruments, the storage, handling and control of radioactive material, radiation protection and monitoring, decontamination techniques, responsibilities of RCEME Radiation Safety Officers, radiation hazards control, practical decontamination training and RCEME field decontamination techniques.

OPERATIONS OF FIELD REGIMENT LADS

Comments on Man-management and Employment of Tradesmen and Gunners

By Cpl P Johnson, 2 RCHA LAD RCEME

The views expressed here do not necessarily represent those of the Director or the Army.

The RCA is dependent on the RCEME for the maintenance of their equipment. On a regimental level the best use must be made of the RCEME personnel in the unit to maintain the equipment at peak efficiency. Under the present system of wide dispersal of a regiment in the field, efficiency is lowered by having all RCEME personnel administered by, and under the command of, a central LAD which may be situated many miles away from the individual batteries. In the interest of efficiency, therefore, RCEME personnel must be attached 'fap' to the batteries. This raises personnel problems and I feel that these problems should be recognized and dealt with.

The functions of the RCA and the RCEME are clearly defined. The function of the RCA is to bring fire to bear on the enemy, and the function of the RCEME is to maintain the equipment so that the RCA can do its job. Except in cases of extreme emergency there is no overlapping of functions.

Just as the functions differ, so do the attitudes desirable in the men. A gunner must be able to perform his drills automatically, and obey orders instantly and without question, whilst a tradesman, though he must be expert in his skills, must maintain a questioning, enquiring attitude to what he is doing. This basic difference in attitudes demands a different approach in the application of authority. Authority in the RCA is based on superior skill and knowledge gained by the practical experience which continues throughout a gunner's career no matter what rank he may attain. Orders can be given on the assumption that there is only one correct method for them to be carried out. Authority in RCEME, however, is based on superior theoretical knowledge, and since each problem differs in some respect from every other, few specific direct orders can be given. The senior man can only advise the man who is actually doing the job, and a highly developed sense of discipline is a handicap. In practice this means that while the automatic reaction of a gunner to an order is "Yes", the automatic reaction of a tradesman is "Why".

The training requirements are perforce equally different. The RCA must concentrate on disciplinary exercises, drill, parades, dress, weapons drill and field exercises to develop the qualities required. The main training demanded of RCEME personnel is practice at their trade, with only as much drill and weapons training as is commensurate with their status as soldier-tradesmen.

These are the essential differences between RCEME and RCA personnel, and the problems of man-management and employment of RCEME personnel in a battery must be considered in the light of these points and the associated questions of recognition, identification and morale.

In a battery the usual establishment of RCEME is six men, and the Battery Commander rightly considers them his men. Usually he makes little differentiation between them and the other men of the battery in regard to training, discipline, attendance at parades, dress, etc. They become to all intents and purposes, gunners with an odd cap badge, and the differences between tradesmen and gunners are disregarded, particularly when in winter quarters. This is done presumably in the hope that they will integrate and identify themselves with the battery. It is extremely frustrating when, as often happens, the battery activities in which they must participate interfere with their jobs as tradesmen. Also, when joint training in working dress is undertaken, the gunner is constantly aware of the difference in dress standards demanded of him and the tradesman, and this leads to a feeling of resentment among the gunners. As already stated, the winter training activities suitable for gunners, disciplinary exercises, high dress standards, etc, are completely opposed to the training required for a tradesman. This is not intended as an excuse for inferior drill or dress on the part of tradesmen. (Usually they are proud of being as well turned out as any military unit, when necessary. As an example, in this LAD, drill exercises were performed voluntarily outside of working hours to raise the standard of drill in the unit.) It is only intended to point up the fact that the tradesmen recognize their area of responsibility - the maintenance of the equipment throughout the year - and resent things which interfere with the efficient performance of their duties. This lack of recognition of their responsibilities, and the resentment aroused, lowers the morale and efficiency of the RCEME personnel, and greatly reduces the chances that they will become contented, integrated, members of the regiment.

In its simplest terms the problem of a tradesman in a battery is one of recognition. If three gunners are lost, operations of the battery will be little affected; if three tradesmen are lost, the battery could quite conceivably, under present conditions, be immobilized. Thus it is obvious that the attached tradesmen have a responsibility out of all proportion to their rank and numbers. At present this fact does not appear to be widely appreciated. If it was, the status of the tradesman in the battery would be very much higher. The differences between tradesman and gunner would be recognized and respected by all ranks, and special consideration given to them in matters of training, dress, working hours and conditions. There are many small ways in which the tradesman could be shown from day to day that his position and function are respected and appreciated without affecting the normal operation of the battery.

This problem of recognition is not a small matter. It is the unspoken thought behind all the complaints regarding attachment to the batteries. It is something that should be constantly borne in mind when considering the disposition and employment of RCEME personnel.

To sum up; the following points are pertinent:

a. Tradesmen must be attached to the batteries for administrative efficiency.

b. Different attitudes and qualities are desirable in gunners and tradesmen so that they can perform their duties efficiently.

c. A close relationship should be maintained among the RCEME personnel in the regiment; their pride in their work and status should be fostered by the obvious recognition of, and respect for, their separate function by the regiment.

d. To improve the flexibility of RCEME services, loyalty to the regiment should be encouraged, as opposed to battery loyalty. For this reason, and to ensure uniformity of RCEME standards, the responsibility for training, military and recreational, and where possible, discipline, should be retained by the LAD.

e. It should be remembered that the tradesmen now with the regiment will eventually man the RCEME workshops. Good relations at the battery level would lead to better understanding at the regiment workshop level.

HONORARY COLONEL COMMANDANT VISITS CAMP SHILO

General, The Honorable AGL McNaughton, CH, CB, CMG, DSO, CD, Honorary Colonel Commandant of The Corps of RCEME visited Camp Shilo from 8 - 12 Jun 61. A Guard of Honour consisting of craftsmen from 212 Workshop RCEME and from attached RCEME personnel of the RCSA under command of S sgt NG Barker met General McNaughton at the gate on his arrival. Accompanied on his inspection of the Guard by Capt EJ Stow, Camp EME, the Colonel Commandant was very complimentary in his remarks of this unusual role for RCEME tradesmen on the Prairies.

Other highlights of his visit included the taking of the salute and addressing the No 70 Squad of the RCA Depot (RCSA) upon their graduation. Troops from the RCA Depot provided a Guard of Honour at the conclusion of General McNaughton's visit.

General and Mrs McNaughton were guests at the home of their son, Colonel EMD Leslie, DSO, CD, Commandant of the RCSA, and his wife. General McNaughton is currently serving on the International Joint Commission and maintains a busy schedule.

SCALING - THE PROVISION SCHEDULE AND ISSUE SCALES

By WO 2 JS Anderson

Introduction

We have seen how spare parts are provided for the first two years of service of a new equipment through the medium of the Initial Spares Schedule. This, however, is in itself only the beginning. The equipment may have an expected service life of from four to twelve years, or even longer. Through all of this life it will require parts for routine maintenance, repairs in the field, complete overhaul or rebuilding. New components have been introduced into the supply system, and have been catalogued and assigned service stock numbers and designations. The Initial Spares Schedule was a document designed to meet the immediate needs of the equipment. Now it is necessary to establish an adequate range of parts and a usable stock level to cater to the long haul of regular service. This is the function of the Provision Schedule. Providing for the distribution of these parts to the repair echelons concerned is the function of the Issue Scales. Hence all parties involved in the stocking, issue, repair and maintenance of the equipment should know something about the structure and content of these documents.

The Provision Schedule

This document is prepared to meet the needs of Central Ordnance Depots, RCOC, who have the responsibility of buying, stocking, and issuing spare parts to meet the needs of the repair organization at all levels. The schedule is written to cover a specific equipment, normally one equipment to a schedule. However, if more than one model or mark of an equipment is in service they will be combined into one document.

Unlike the Initial Spares Schedule, where components already in the supply system in sufficient quantities were ignored, such items cannot be disregarded in the Provision Schedule. This schedule must list all repair parts and assemblies which will be used in the maintenance and repair of the main equipment throughout its full service life. The cataloguing of all components listed must have been completed. This is essential for proper identification of the parts, and is a matter of prime importance in all the phases of purchasing, storing, demanding and issuing of stores. Proper cataloguing may well widen the sources of supply, and thus improve the procurement status of the component. It also helps to ensure that the repair technician gets the correct part for replacement.

The assessor who is writing the Provision Schedule must, therefore, prepare a draft list of all the items which are to go into the Provision Schedule, checking this list against the Initial Spares Schedule, the Equipment Issue Scale, and his own original list of repair parts. He must be familiar with the Permissive Repair Schedule for this equipment, and he now annotates his draft list to indicate the echelon or

echelons which will use the part in maintenance. Now the factor of the distribution of the equipment must be considered - which units hold the equipment, how many they hold, and the local maintenance facilities. It should be noted here that the assessor does not have to provide for the initial filling of the supply pipeline. This is subject to separate procurement, and is not a RCEME responsibility.

From all of the data which he has been able to gather the assessor now prepares a 'spread sheet'. On this he indicates where each part will be used in maintenance and the proportionate split between base, field workshops, and unit maintenance. Much of this is guesswork, but it is an educated estimate based on experience and knowledge of the equipment type, the nature of its service (and service conditions), and the feasability of repair at each echelon. With all of this in mind, the assessor now can assign an annual wastage figure for 100 equipments, spreading repairs over the full expected service life of the equipment. This is the figure which he inserts in his draft list as the annual provision figure for 100 equipments. Since usage in peace time is different from that in war time, two figures are calculated and entered in appropriate columns. For the convenience of RCOC a column giving the estimated requirements for one major overhaul of 100 equipments is provided.

Now the schedule is nearing its last stages. The cataloguing of the list is checked, and items are arranged in alphabetical sequence. To improve the mechanics of the whole operation the assessor usually works from cards. He started with a Parts List, for the most part uncatalogued; these items are listed on individual cards, and the correct cataloguing and all the scaling figures entered on the card. The cards are shuffled into the correct sequence, and copied onto a Draft Provision Schedule. The cards are again shuffled into numerical sequence by part numbers and an index is prepared. A copy of this is passed to RCOC for pricing. The completed draft is checked by the assessor and then checked for format and accuracy of content by his supervisor and by the chief assessor. After having been approved, it is typed on masters, proofread, corrected where necessary, and finally shipped to ADEME Technical Services for approval, publication and issue.

Issue Scales

The factors of distribution of equipments and permissive repair were considered in the preparation of the Provision Schedule, and the proposed split of stock between base, field workshops and unit was calculated on the assessor's Spread Sheet. He now must determine exactly which Issue Scales will be required. For example, if no unit repairs are authorized, then obviously no Unit Basic Scale is required. He must also determine what quantities of equipments are liable to appear on the workload of each maintenance echelon at any given time, establishing minimum and maximum workloads. The minimum and maximum figures are then divided into steps to cater to in-between workloads, so that a fair average number of spare parts can be authorized for the applicable maintenance group. This is arranged in a

series of 'ladders' covering concentrations of, for example, 1 to 25, 26 to 100, 101 to 250, 251 to 500 equipments, and so on.

With all of these factors established, the assessor is now ready for the actual mechanics of writing the Issue Scales. At the time that the Provision Schedule was being typed in its final form, four to five carbon copies were typed with the quantities columns left blank. Now all that has to be done is to take these copies, one for each Issue Scale to be produced, and compare them with the Spread Sheet. Non-applicable items are deleted, ie, items not within the permissive repair scope. The annual provision figure is multiplied by the appropriate split factor, the result is multiplied by the stockage time factor, and this resultant is multiplied by the applicable ladder factor and the final figure is entered in the appropriate column of the draft scale. This draft is checked and double checked to ensure that it does not contravene the DEME repair policy; that it does contain all requisite parts in appropriate quantities; and that the Provision Schedule and Issue Scales present a logical and cohesive whole in providing for the continuing maintenance of the equipment. After this has been done, the final draft is typed on masters, proofread and corrected, and sent to ADEME Technical Services for their approval and publication.

Conclusion

In all of the supply documents, the Initial Spares Schedule, the Provision Schedule and the Issue Scales, great care is taken to ensure that they are as accurate and as complete as possible. Each document is designed to do a specific job and to meet a specific need. Each document has a group of preamble pages which explain its function and describe its make-up and use. While these pages are similar in format they are tailored to the individual equipment and the repair policy governing it. Hence the importance of a careful reading of these pages by the user cannot be over-emphasized. The technician who is familiar with these documents and knows how to apply them will be far more effective than the technician who does not bother with them. If he does not have the scales for the equipments for which he is responsible he should take steps to get them and use them intelligently, for no technician can maintain his equipments properly if he does not know what parts he is authorized to use and how to get them when he needs them.

ARMAMENT AND SMALL ARMS REDESIGNATED

REDESIGNATION OF INSTRUCTIONS

Instructions in the Armament and Small Arms Parts of the EME Manual have been redesignated under the new Weapons Part. This is covered in Weapons A 009 now being published. To make this change as simple as possible, only the designation has been changed; the issue number and instruction number, where applicable, remain unchanged. This explains why "Weapons R 500", for instance is "Issue 5" in spite of the fact that it is actually the first issue under the redesignated number. If and when it is reissued it will become "Issue 6".

MANAGEMENT

METHOD STUDIES

By S sgt HR Jones

The management courses conducted by The RCEME School are starting to show dividends. The enthusiasm engendered is reflected by increased efficiency and savings on the production line. Method Studies are being produced by the course graduates and some have been forwarded to DEME. The Management Section of DEME is now starting a library of method studies submitted. In order to show appreciation for the study and hard work involved, it has been decided to give wide publicity to the studies and the individuals responsible.

Other workshops can benefit and personnel should be encouraged to work out more efficient methods of their own. It is our intention to publish a resume in the Technical Bulletin of all studies submitted. The first one received is written up in the article following.

IMPROVED METHOD OF PAINTING METEOR ENGINES IN 202 BASE WORKSHOP RCEME

When the complete overhaul of Meteor engines was undertaken in 202 Base Workshop, it was obvious that one of the difficult operations was the painting of the engine and its many components. Because of the inherent complexity of the engine, it was necessary to brush-paint some 41 separate partial assemblies prior to final assembly. At that time, this work was carried out by one man, a skilled brush painter who, as production progressed, was able by experience to maintain the pace with increased production by his complete understanding and familiarity of the many components involved and of his personal knowledge of the exact time and stage at which the component or sub-assembly would be required in the line build up. The time spent on the painting was 13 man/hours per engine. From this it will be understood that painting of the engine and components became a key factor in production that could be disrupted at any time by illness or replacement of this highly trained employee.

The problem at this point was considered twofold. First, painting was dependent upon the individual knowledge and training of one man. Second, the expenditure of 13 man/hours per engine was considered to be unnecessarily high. It was obvious that Prod Dept required a method of spray painting the engine utilizing standard spray painters from the Paint and Preservation Section. Accordingly, the Technical Supervisor, Mr JO Wattie, was given the task of carrying out a methods study with these points in mind. As Mr Wattie had just successfully completed the management course at The RCEME School, this was considered an excellent project on which to apply his new-found knowledge.

The first question was to determine at what stage of the build-up of the engine painting should take place. In collaboration with S sgt Jones, HR, the Supervisor of the Meteor Engine Line, it was decided that two alternative methods were possible. Method No 1 would entail the painting of the components prior to assembly on the main engine itself. Method No 2 was to paint the engine with the majority of components assembled to it. Method No 1 was ruled out because of the large number of intricate masking jigs required, difficulties of transportation and scheduling of the components to match the production in the Meteor Engine Line.

It was decided that as many components as possible should be mounted on the engine to minimize separate masking and painting. As the ignition harness could not be painted, this determined the stage of assembly at which painting of the engine should take place, ie, all components assembled after the ignition harness was in place would have to be painted individually. To allow a preliminary methods study, an unpainted engine, assembled as in the preceding paragraph, was passed through Paint Section. Masking was carried out by taping where necessary, and despite the 134 operations involved, painting time was only 1 hr 20.5 min.

The next step was to design masking jigs to reduce the number of operations. Reference to Fig 1 will show that the 4 jigs "A", mask the 40 inlet manifold studs and 4 mounting surfaces, and the two jigs "B" mask the 48 exhaust manifold studs and 12 mounting surfaces. Two unserviceable magneto caps "C" are used to protect the magnetos and 24 standard plastic preservation caps "D" are used to mask various coolant and oil orifices and to mask union threads. All these reduce the number of masking operations to 36 and the painting time to 30 min.

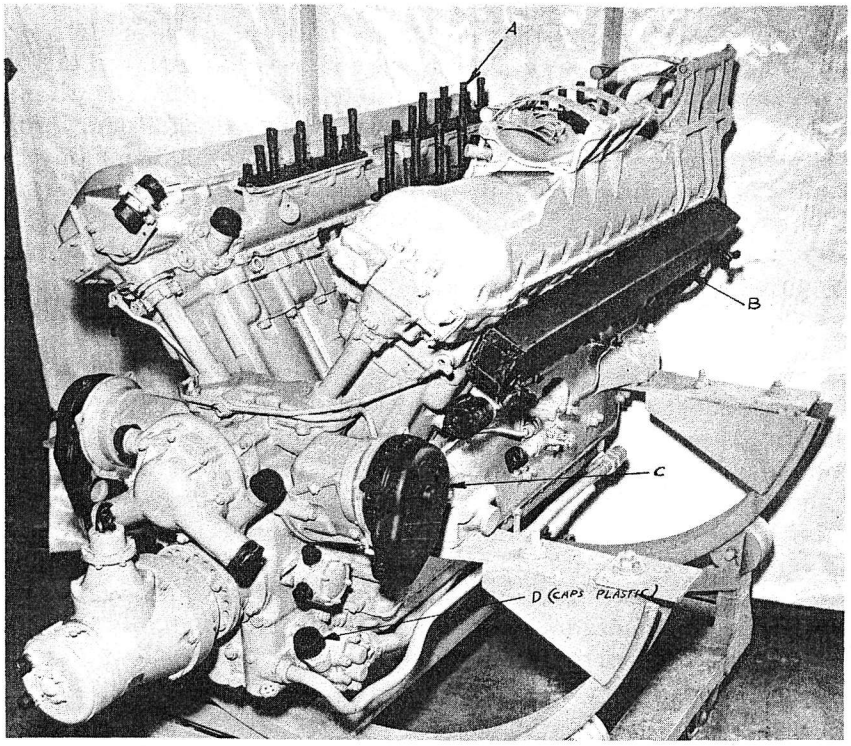


Fig 1

The component jig (Fig 2) was designed in pallet form for ease of transportation to the spray booth. The induction manifold is spray-painted as a complete unit at the same time as the components. Use of standard preservation caps for masking pipe ends or threads is again employed and the working surfaces of the fan belt pulleys and tensioner rollers being masked with a sheet metal clamp. The components are grouped in such a manner so that loss of material from overspray is reduced to a minimum, and spraying time is reduced. Total time for component masking and painting is 27 min. These times include time for pre-cleaning and fetching necessary materials. By keying painting process to line production, drying time takes place during shut-down hours. Total time to paint the complete engine assembly is therefore reduced to 57 man/minutes.

By reducing painting time from 13 man/hours to, first, 2.3 man/hours and then 0.95 man/hours, a total saving was effected of $56.24 per engine. With an annual output of 100 engines, annual saving is $5,624.00.

The flow process charts shown, detail the change of method from 2.3 man/hours to the final method resulting in the time of 0.95 man/hours.

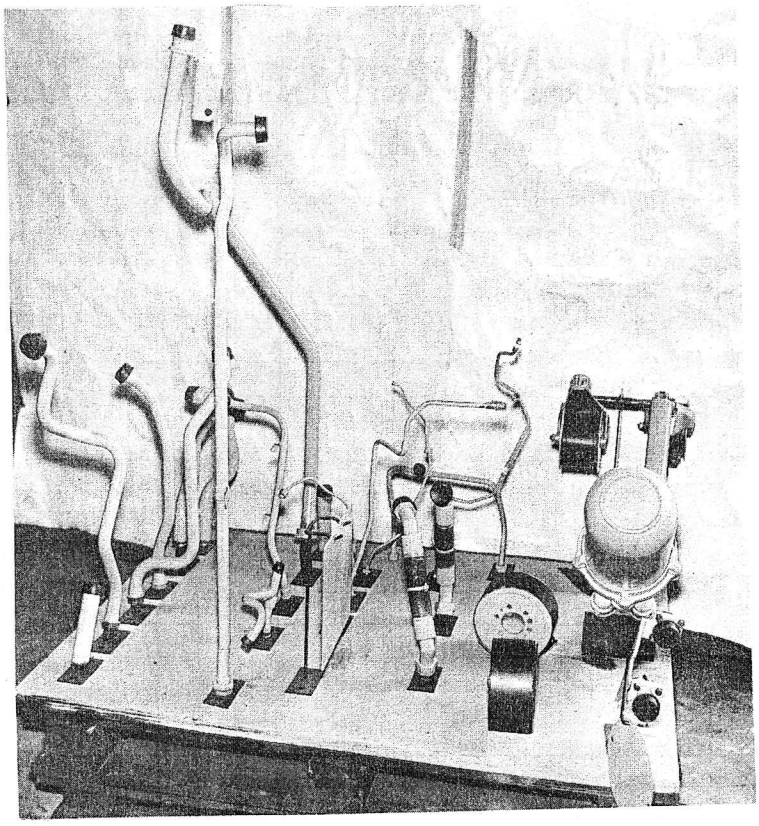


Fig 2

PRESENT METHOD

STUDY OF PAINTING ENGINE ASSY METEOR MK 4B
STUDY BY: J.O. WATTIE
PRESENT METHOD

TIME IN MAN MINUTES

Ser. №	Description	Rec. Time	Bas Tim
1	From Paint Shop to Oil Shed to get cleaning material 3GP8 Varsol 75 ft.	.5	
2	Lay out components on pallet for cleaning 25 parts	2	
3	Clean engine and components by hand using a 3" cleaning brush	7	
4	Get air hose from Paint Booth 20 ft.	.15	
5	Remove cleaning material from engine and components, using prepared compressed air 80 lbs pressure	12	
6	Inspection engine and components for cleanliness	2	
7	Put air hose away 20 ft.	.15	
8	From Paint Shop to Oil Shed for masking tape 75 ft.	.5	
9	Mask engine, 114 parts	25	
10	Check engine after masking	2	
11	Mask components, 25 pieces	18	
12	Check components after masking	.5	
13	From Paint Shop to Oil Shed for Enamel 75 ft.	2	
14	Mix and thin paint	4	
15	Fill spray gun	1	
16	Spray engine 1 coat	8	
17	Refill spray gun container	1	
18	Finish spraying engine 1 coat	2	
19	Put spray gun on hook	.15	
20	Check engine for paint coverage	2	
21	Remove sprey gun from hook	.15	
22	Spray components 1 coat, by removing from pallet and holding in hand	20	
23	Put spray gun on hook	.15	
24	Check components for paint coverage	.5	
25	Remove spray gun from hook	.15	
26	Spray engine 2nd coat	5	
27	Spray components	1.5	
28	Check engine and components for paint coverage	2	
29	Clean spray gun	4	
30	Put enamel away in Oil Shed 75 ft.	1.5	
31	De-mask engine and components	15	
	SUMMARY OF PRESENT METHOD		
	Make Ready Operations: 6		
	Do Operations: 8		
	Put Away Operations: 1		
	Transports: 10		
	Inspections: 6		
	Total Time Required: 140.5 man minutes		

PROPOSED METHOD

STUDY OF PAINTING ENGINE ASSY METEOR MK 4B
STUDY BY: J.O. WATTIE
PROPOSED METHOD

TIME IN MAN MINUTES

Ser. №	Description	Rec. Time	Basic Time	P R
1	From Paint Shop to Oil Shed to pick up cleaning material, masking tape, and engine enamel 1 Qt. Varsol, 1 roll tape, 1/2 gal Enamel	1.5		
2	Lay out components on work bench. Qty 25	2		
3	Wash with cleaning material	7		
4	Fill spray gun with Varsol	.15		
5	Spray clean engine	2		
6	Get air hose from spray booth	1		
7	Remove cleaning material from engine, using prepared compressed air, 80 lbs pressure	4		
8	Check engine for cleanliness	.5		
9	Place components in a holding jig, and mask open ends with plastic caps	9		
10	Place jigs on intake and exhaust manifolds and plastic caps on oil and cooling lines	7.15		
11	Thin enamel and fill spray gun	3		
12	Spray 1 coat over components and engine	6.15		
13	Check engine and components for coverage	1		
14	Put away spray gun and wait 1/2 hour before applying second coat	.15		
15	Spray second coat over engine and components	3		
16	Clean spray gun and put away	4		
17	Remove jigs from engine and components	5		

SUMMARY OF PROPOSED METHOD

Make Ready Operations:	5
Do Operations:	6
Put Away Operations:	2
Transports:	2
Inspections:	2
Total Time Required:	57 man minutes

MANAGEMENT TRAINING FOR ARTIFICERS

By WO 1 AW Rowe

The WO's Management Course for RCEME artificers is conducted for a three-week period scheduled as part of the main artificer course. The scope of this training is broad and includes the principles and practices of four phases of management:

a. activities of management,

b. work study techniques,

c. human relations techniques, and

d. on-the-job instruction techniques.

Military writing and RCEME control and accounting procedures are also included in the course.

The students are exposed to the theory and development of management practices in the terminology contained in the various reference textbooks. They are given the opportunity to apply the principles and practices during simulated exercises, based mainly on work study and human relations. A time element is involved in these exercises and those students who apply the logical systematic thinking process, which is taught in the more theoretical activities phase, usually end up with the best solutions in the shortest time.

From the instructional point of view, the course is the beginning of managerial training, NOT the end. The artificer must be encouraged to further his knowledge by reading and studying management textbooks. It is only by this means that the many theories, principles and practices will stay fresh in his mind until he gets the opportunity to put them into practice. This is the main reason for using management terminology during the training lectures, although this makes it more difficult for the average artificer to understand the subject matter. Considerable time is used to explain terms and expressions such as "synthesis from element data" and "analytical estimating". Yet this must be done, if we expect the artificer to read and understand books that abound in such terms.

At the time the artificer has completed this training, he is fully capable of recognizing and correcting faults and conditions within his own section such as:

a. poor layout of work places, machines and equipment (Method Study - Diagrams and Models),

b. ineffective and unsafe work methods (Method Study - Principles of Motion Economy),

c. congested areas causing backtracking and excessive movement of men and materials (Method Study - String Diagrams),

d. poor scheduling of work caused by lack of planning (Activities of Management - Planning),

e. unequal distribution of work (Activities of Management - Organizing),

f. confusion among subordinates due to overlapping of areas of responsibility (Activities of Management - Statement of Duties),

g. disgruntled subordinates due to lack of progress in trade (On the Job Instruction - Training Junior Tradesmen),

h. employees with grievances (Human Relations - Handling a Relations Problem),

i. employees' lack of interest or initiative (Human Relations - Stimulate the Will to Work),

j. petty conflicts between sections (Activities of Management - Co-ordinating) and

k. work stoppages caused by running out of parts or materials without warning (Activities of Management - Controlling).

He is also able to recommend changes by presenting to his superiors, before and after records and diagrams of the facts about a situation. His accompanying report will be concise and include statements concerning savings and costs of setting up the recommended change.

The qualifying statement for these claims was "at the time the artificer has completed this training". If there is little evidence of these practices being carried out in RCEME workshops, then there must be other factors to consider. By, "projecting ourselves into the artificer's shoes", some of these factors may become apparent.

Management training is conducted in much the same manner as a high school course; a portion of each subject each day using different instructors for each subject. This is completely different from the way trade courses are usually conducted and may require the student to adjust himself to this method of instruction.

The subject matter and terminology is entirely new and takes longer to grasp than a related trade subject. It is strange that the terminology is new, for many courses have been conducted during the past five years. Evidently there is a lack of communication here. It seems reasonable to expect successful artificers to pass on information and help the men to prepare for such courses.

Another factor is the wealth of precis issued daily that the students are expected to read at night. This creates a feeling of too much homework and too fast a pace. This is all basically true; there is a lot of boning up to be done at night, but it is a career course. Men with a future in management are required to train their minds to absorb new material quickly and accurately.

There is a written examination at the end of each phase; five in all, plus two home assignments in Military Writing. Students feel that some examinations are too hard or too long for the time allotted, yet few fail and the majority finish these tests and most of the time write more than is required.

The students receive management training either at the beginning, in the middle of, or close to the end of the trade portion of the artificer course. This arrangement has to be flexible because of the limited facilities and capacity of the management training platoon.

Those students who attend the management training at the beginning of their trade course will be subjected to trades training for 20 to 30 more weeks. This is a long period of time to retain knowledge without practical application of the subject matter.

Upon completion of the entire course, they are usually posted to new units. This means adjusting to an entirely different job, new faces, new housing and generally all of the problems of breaking into the new job. Here is another time lag.

So far students have been discussed generally. Looking at them as individuals, many are above average and have no problem with the course. They are men who can and will apply the techniques whenever they have the opportunity to do so. Others have poor educational backgrounds and have to struggle. They will always be unsure and lack confidence to try anything new, unless they improve their educational standard.

A third group, from their past experiences, cannot see where they will be able to apply this knowledge. They are only associating the course material with the job they have left behind; thinking as technicians not as managers of the future who will be required to make many decisions.

There is another group who are willing to try out new ideas if they think that their proposals will be well received by their superiors. They will make mistakes, but need encouragement, not rebuffs.

Collectively the present day artificers have a greater potential than they realize. They must learn that management is a new way of life. The principles and practices are valuable to them if they are used properly. Here is a brand new tool kit to be used as skilfully as the trade tools. A little time spent in reflective thinking about their individual goals and how they are to be reached, may start this development of new skills.

These are the factors to be considered if the artificers are to develop into capable managers. There must be some soul searching by everyone concerned with the problem.

The men who are preparing themselves for artificer training should set goals to develop education and knowledge. They should be inquisitive about the meaning of words and how to use them. They should think ahead not of just to-morrow, but of where and what they will be later in their army careers.

The superiors of these men should aid in this development. Those who have experienced the same difficulties should be eager to help remove them from the path of their subordinates. New terminology and ideas should be explained and the men encouraged to assist in developing new and better ways of doing things.

The instructors who teach the basic course, must strive to find better and easier ways to pass on this knowledge. They must also be receptive to new ideas and listen to suggestions from the students.

The students must realize that the training is for their development. Study of reference material is not to be done just to pass an examination. Reviewing the precis and reading new books on the subject should be part of their plans for growth.

The superior managers who will receive these new artificers, should recognize that there has been a great time lag since these men received their managerial training. Perhaps, after their period of adjustment to the new job, some project or problem in this field would be the needed encouragement. They will make errors but they will try again if their efforts receive recognition.

Management practices have a definite place in the Corps. It is an expanding field that started slowly, but now includes courses for every level of manager in our workshop system. Many students on the senior courses have said "I wish I had had this course ten years ago".

For the artificers a final thought: this is the right time for you, make the most of it. Management is teamwork and we are all on the same team.

ARTIFICERS OR ENGINEERING TECHNICIANS - WHAT DO WE NEED?

By Lt TM Mimee

The views expressed in this article are those of the author who is an Engineering Technician Grade 3, and do not necessarily represent the views of the Director or the Army.

Perhaps some of our vehicle artificers will wish to comment on Lt Mimee's remarks. They are encouraged to do so and should send their articles through RCEME channels to DEME for publication in a future issue of the Technical Bulletin.

In this modern day and age with armies involved with equipments of increasing complexity we are often faced with the question - have our artificers the qualifications to meet the challenge? Private industry in Ontario seems to have solved this problem with the co-operation of the Province in technical schools together with the Association of Professional Engineers of Ontario.

The new species to emerge is the Engineering Technician and his more advanced brother, the Engineering Technologist. As the latter is outside the scope of this article, let us define the Engineering Technician. He is a man whose work falls between that of a skilled craftsman and the professional engineer. His work is technical in nature but narrower in scope than that of an engineer and has a practical rather than a theoretical orientation.

Defined simply, the artificer is a skilled craftsman working under the guidance of and with professional engineers. His work is technical. On the other hand, he has additional duties to perform. He must know and use the principles of management, production schedules, time and motion studies, workshop layouts and procedures and so on.

Can a comparison be made between these two men?

To become an Engineering Technician Grade 1 (there are three grades) a man must have at least a grade 12 academic certificate plus two years practical experience. He is thereby eligible to attend an advanced technical evening class sponsored by the Ontario Department of Education. Upon completion of this course he is eligible to attend further courses leading to his grade 2 and grade 3 certificates.

How many subjects are taught on these courses? How long do they take? Obligatory subjects taken are: English, mathematics 1 and 2, mechanics or physics. A candidate must choose five optional subjects which could be: chemistry, physics, workshop technology, electricity and electronics. As a matter of interest the optional subjects also include heat, mechanics, metallurgy machine design, tool design, instrumentation and technical drawing. The length of time to complete each grade leading to a certificate is three years. Meanwhile the man must still be employed at his specialty by day under the supervision of a professional engineer.

This in brief is the background, both academic and practical, of the Engineering Technician.

Now what about the artificer? Needless to say, it is unnecessary to go into such detail as shown above for the Engineering Technician; we are familiar with the artificer's practical and theoretical background. To refresh our minds however we can simply state that he has a grade 10 education and an "M" score of 150. He should have a minimum of five years experience at his trade.

With the definitions and the qualifications stated, let us proceed to answer the question, "Artificers or Engineering Technicians - what do we need?"

Unfortunately, this question cannot be answered in a general sense. One must be specific and relate the question to a specific trade. By the same reasoning, the type of workshop must also be specified. These two factors are important because they clearly establish our 'ground rules'.

Let us select the Field Workshop because it is a typical RCEME field unit. Let us also consider the Radio Artificer and the Vehicle Artificer.

The vehicle artificer supervises men whose task is primarily one of replacing assemblies. He is interested in quick efficient work - the right piece in the right place, properly fitted and torqued. The time he spends on analyzing vehicle troubles is comparatively small. However he has the skill and knowledge needed to inspect a vehicle and decide what is required to repair it. This is based on a knowledge of performance specifications.

Would an engineering technician do a better job of work than a vehicle artificer? We think not. We do not even think he could do the job as well! Man management is an important factor here. The vehicle artificer, as part of his daily routine, must encourage, motivate, berate, threaten, etc, his personnel to work under the most trying conditions of weather, lack of spare parts, poor meals and other items of a related nature. We consider therefore that the vehicle artificer's practical experience and his knowledge of management is more important than the additional theoretical knowledge as typified by the engineering technician.

We strike a controversial note when we attempt to compare the radio artificer. Here the academic backgrounds of the engineering technician and the radio artificer are less clearly defined. It must be agreed that the radio artificer must assimilate and deal with theory as long as he remains in the trade. Other tradesmen have coined descriptive phrases for the 'megacycle types' which we will not belabour here. The radio artificer performs a similar task to the vehicle artificer except that there is a considerable increase in theoretical knowledge required to do the work. He also devotes more time to analysis of faults and less time to supervision of straight mechanical

work. In a business where techniques and designs change rapidly and radically by comparison to the mechanical trades, he requires a thorough knowledge of basic concepts and the ability to convert his knowledge to practice. We consider therefore that the radio artificer is an engineering technician basically and additionally qualified by virtue of his knowledge of management.

In conclusion, we do not think that the engineering technician is needed in the vehicle trade; the artificer is doing a first class job. The artificer in the electronic field needs an advanced technical knowledge of his trade. This type of knowledge is found in the engineering technician; therefore let us call a spade a spade. In the electronic trades we don't need an artificer, we need an engineering technician.

Maj Gen G Walsh, GOC Western Command, making his annual inspection of 1 Field Workshop RCEME, in Calgary, on 24 May, accompanied by Maj HF Protheroe, CO of the unit.

National Defence Photo

By HC Mussell

In the Feb 61 issue we 'threatened' a series of articles on contract procedures. This article deals with allotments.

In the last issue we used the terms Primary 79 and DEWAO funds rather loosely (even to the extent of referring to Primary 79 in the last para as Primary 70). Perhaps a word of explanation is in order before everyone is completely confused. Actually all RCEME repair funds (including DEWAO funds) are Primary 79. However, over the years RCEME has used the term Primary 79 to mean only those funds used for LPO and PR (and recently Petty Cash) purchases. Therefore, although the term is slightly incorrect, it is short and simple so let's continue to use it as we have for several years.

In December, preceding the fiscal year, we are asked by Budget to provide amounts for the Primary 79 initial allotments. In determining these amounts we consider the amounts which you have requested in your estimates; the expenditure trend since submission of your estimates; and, last but not least, the total amount which Treasury Board has approved for RCEME Services. We also keep a small reserve (approximately 5 per cent) for further allotments 'as needed' towards the end of the year.

The amounts provided to Budget are passed for approval to the Chief Treasury Officer, VCGS and DM and the amounts actually approved allotted by Budget in January.

Now for the end of the year! As mentioned above we keep a small reserve for 'end of the year' needs; 5 per cent was mentioned but it is not the intention to restrict a command or base workshop to a 5 per cent increase. If you need additional funds for RCEME Services, give us reasonable substantiation and we can generally provide. On the other hand, if your review indicates a substantial surplus, this should be offered for return to the above reserve since it could be needed in another command or base workshop, or even another primary. Unless we indicate that funds are extremely short, it is advisable to retain a small surplus for possible rush jobs in the last weeks or days of the old fiscal year.

DEWAO allotments are similar, except that they are handled on the RCEME net. Therefore your requests for allotment changes can be made by simple letter, wire or phone.

So much for getting the money, in the next issue we will discuss spending it.

ELEMENTS (SOME ONLY) OF DIGITAL COMPUTERS

By Major WR Willing

The intention of this article is not to baffle the reader with science but merely to pass along a few words about a relatively new electronic device called the "digital computer". There are reasons for spending a moment or two on this subject. The day is not far distant when certain types will become a RCEME repair load. In fact, if no unforeseen event occurs, three years or less will find a limited number in use with the "fighting troops".

A Misconception

There are a number of popular misconceptions about computers. The advent of the so-called missile age has stirred the imagination of pseudo-technical reporters and cartoonists to the extent that perhaps there are some who feel that their heirs may even end up working for a computer one day. Although it is unwise to say that anything is impossible, we can be sure of one thing, modern computers do not and cannot think. At least at this time, the expression "electronic brain" is therefore a misnomer.

If a computer cannot think, it follows that it must be very dull and in a sense, stupid. This is exactly true. It will not do anything without being told. Furthermore, when given an order, it will not know what to do unless it remembers how you told it to interpret that order in the first place.

What is a Digital Computer?

Anyone with a passing interest in computers may be aware that there are two main classes, analog and digital. They are both "mathematical calculators", but their basic methods of calculating are quite different. Both types exist in mechanical and electrical form. Since the mechanical forms have been around for many years, consider two examples.

The Analog Computer

The ordinary slide rule is an analog computer. On this instrument, physical distances are analogous to logarithms. To multiply numbers, logarithms are added. On the slide rule, the same result is achieved by adding distances. An electronic slide rule could also be called an analog computer. Its function could be based on a second analog, for example, the use of volts for inches. When ordered to multiply, it would then add volts instead of inches and the corresponding numerical product could be displayed on an appropriately calibrated voltmeter.

The Digital Computer

The ordinary business office adding machine accomplishes the same task as a basic electronic digital computer. It deals with numbers

or digits and is superior to its analog counterparts in calculation accuracy. The standard office machine can usually add, subtract, multiply and divide, in short do simple arithmetic. So do some digital computers. In both cases, however, the machines must have built-in instructions telling them what to do when a "number" or the " + " or the "TOTAL" button is pressed.

Memory

In the electronic digital computer, instructions (or 'commands', as they are called) make up a program. This is recorded in a device called the memory. The memory takes many physical forms such as magnetic tape, drum, or disc, or more recently, a ferrite core.

In addition to a permanent memory which stores special information at all times, the computer is fitted with a "working" memory, which stores and releases information as required during the solution of a problem. One might regard the working memory as the paper you use when working out a problem the hard way. In fact, one may "write" on or "erase" from the working memory at any time.

Computer Language

The ordinary digital computer does not understand English, nor does it appreciate ordinary arabic decimal numbers. There are several reasons for this. A basic one is economical. There are a lot of electronics, by quantity if not complexity, in a digital computer, and a ready means had to be found for simplifying things. One might well question whether or not the designers were successful along this line; however, what could be a simpler building block than a switch which is either "on" or "off"?

Having selected a switch, it became necessary to evolve a method of using it to represent a number. After all, this machine is going to handle numbers. It is obvious that one switch will not "count" very far. If "zero" corresponds to an open switch then "one" would correspond to a closed switch and the count could go no further. If several switches are provided, however, the capability for counting is limited only by the space one cares to occupy with switches.

It happens that the combinations of the on/off states of say, three switches, is 2^3 or 8. This can be shown in the table below. Here the symbol 0 is used to represent "open" and the symbol 1 is used to represent "closed".

Switch No 1	Switch No 2	Switch No 3	Decimal Count
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

In like manner the positions of a series of switches can be used to represent any decimal number we wish. To apply this scheme in computer design, however, it should be noted that basically the machine will only recognize two states, "on or off", and "open or closed", if you like "a zero or a one". So it is necessary to consider relations between different number systems, in this case the simple system created for the machine and the decimal system with which we are familiar.

It is a simple but sometimes laborious task to convert from one number system to another. Let us briefly consider the binary system, one about which you may have heard. It uses only two digits, a zero and a one (hindsight prompted these symbols in the table above) and so 10011 is a binary number. To what decimal number does this correspond? In the same way that the decimal number 121 can be represented by:

$$121 = (1 \times 10^2) + (2 \times 10^1) + (1 \times 10^0)$$
$$= 100 + 20 + 1$$

so the binary number 10011 can be interpreted as:

$$10011 = (1 \times 2^4) + (0 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$$
This equals $2^4 + 0 + 0 + 2 + 1 = 19$

The binary number 10011 is said to contain 5 bits (digits if you insist). So you may read for example that a particular computer uses 18-bit words. This is simply an indication of the largest number which can be stored as a separate entity.

Why limit the number of bits in a word? This is a logical question because useful memory space will accommodate thousands of bits. One practical difficulty is that to write a number in the memory it must be known exactly what "word space" is being used. Otherwise neither the operator nor the computer can recall that word when required. It proves convenient, at least in some machines, to make all word spaces the same size. In these cases, word length may become a compromise between maximum information per word and maximum number of words. In other cases, the "time to read" may be important; some machines "read" one bit at a time, others may "read" the whole word simultaneously.

Word Addresses

Just as for delivering mail, word spaces are given addresses. These can be merely a set of numbers with sufficient digits to identify the "street" and the "street number". The address is previously recorded in a part of the corresponding word space, as binary bits. When the computer operator chooses to enter a number in the working memory, he first selects an address, then enters the number on a control panel. The computer, perhaps on instruction from the permanent memory, then only writes this number in the addressed word space. It will not record it at any other time or place.

Computer Commands

As has already been mentioned, a computer will not do anything it has not previously been told. Once told, however, it will act with precision and speed. A good example of this was reported recently in a periodical under the by-line "The Computer Remembered". It seems that an otherwise successful launching of a rather expensive missile was suddenly terminated in a loud cloud of exploding hardware. The reason ... the associated computer had been told, (that is, programmed), to test for a serviceable warhead shortly after launch.

Someone neglected to "advise" the computer that a dummy warhead was to be used. At the appropriate moment, finding a "dud" warhead, the computer automatically caused a signal to be transmitted which, in turn, caused the missile to destroy itself ... much to the chagrin of all concerned.

The number of different commands one might design for a digital computer is almost without limit. For lack of space consider only a few. By now we should have a vague idea that the answer to the problem will show up somewhere in the electronics as a number, though represented by the on/off states of a series of simple switches. This means little to a man with pencil poised, who would like to know the answer.

Logical commands to the computer at the end of a problem would thus be: "when you have the solution, store it at address 2743, type it out, and stop working".

What is a command? Since the computer only deals with numbers, a command must have the form of a number. One simply creates a command code and designs the computer logic to interpret these as "instructions" rather than numbers. Commands therefore are simply special numbers, and there are many ways of preventing the machine from slipping these numbers by mistake into the real problem.

Computer Logic

No mention of digital computers can be complete without a word about computer logic. Your writer is not aware of the origin of this word in computer design. It simply is not compatible with the statement that computers do not think. Yet it must be accepted. It is used everywhere.

Logic refers to many different types of circuits some of which are called "decision elements". It happens that a knowledge of the relatively unfamiliar Boolean Algebra is essential to a detailed understanding of this type of logic. Fortunately by using some analogies one may get the idea without the course.

One example of a logic circuit is known as the "OR" gate. You may assume this gate to be a small black box with two input terminals and one output terminal. The mechanically inclined may wish to think

of an automotive differential applied in reverse. The logic may be stated as follows: "If one rear wheel or the other is turning, the drive shaft is turning". (No teeth missing, please).

The electrically-minded, on the other hand, may prefer to think of two independent single-pole single-throw switches which are connected in parallel. "If one switch or the other is closed, there is a circuit".

So, with the "OR" gate, if either one input or the other input is present, there is an output. Electrically, it is easy to arrange other combinations and inputs numbering up to 10 or more can be used.

Maintenance

Finally, how about maintenance? Construction will be miniaturized with plenty of printed circuit/transistor plug-in boards. Some of these may be potted, others not. Fault location will be a new experience. The answer to the old question "why so much theoretical training?" becomes a little clearer in this particular brand of gear. The technician will have to be interested in arithmetic and algebra and in new forms of both, and be capable of applying them. He will have to understand the logic as well as the electronics, because the logic is usually the first thing to go astray.

There will be room for mechanical skills, also. The basic computer is useless without certain external equipment which can act as an interpreter between the operator and the machine and vice versa. Many of these devices are mechanical. When someone mentions "peripheral equipment" this is what they mean.

One thing is certain. The technician, whoever he may be, in a manner of speaking, will have to "throw away" familiar test gear and really start thinking.

For anyone who doubts this, the line for the first course forms on the right.

WHO'S WHERE

LOCATION OF RCEME WARRANT OFFICERS

Class 1

Anscomb	GW	5 Coy RCEME
Baynes	CH	6 Coy RCEME
Beddows	RS	The RCEME School
Boshier	R	8 Coy RCEME
Brennan	RS	The RCEME School
Brown	AT	10 Coy RCEME
Brunton	AC	56 Cdn Inf Wksp
Buck	WM	14 Coy RCEME
Clarke	DL	RCD LAD RCEME
Conway	RF	16 Coy RCEME
Cozens	SD	The RCEME School
Dillon	TF	ADE
Dodds	TH	The RCEME School
Dudley	J	Br of AG (D Org)
Elliott	WEL	4 Coy RCEME
Fernets	JM	11 Coy RCEME
Fox	HR	ADE
Gallier	H	The RCEME School
Gladwin	CH	CADEE
Gray	P	DEME
Guilfoyle	ME	LdSH(RC) LAD
Hayes	JW	DEME
Henry	JE	FGH LAD
Houlton	VH	DEME
Hunder	BAJ	The RCEME School
Hurd	LR	202 Base Wksp
Jackson	O	10 Coy RCEME
James	JW	RCAC School
Keech	HL	DEME
Kennedy	HG	13 Coy RCEME
Knight	RA	16 Coy RCEME
Knowles	GA	4 Fd Wksp
Langford	WH	2 Coy RCEME
Lawson	RW	10 Coy RCEME
Leach	FH	10 Coy RCEME
Leon	BU	1 Fd Wksp
Leonard	WV	14 Coy RCEME
Lewis	SM	8 Cdn H LAD
Longley	GM	12 Coy RCEME
Lowry	LH	DCER
MacDonald	DJ	DEME
MacDonald	J	The RCEME School
McCague	LT	204 Base Wksp
McInnes	DM	18 Coy RCEME
McMurchy	WJ	202 Base Wksp
Meloche	JR	Que Comd I Staff
Mercer	JL	The RCEME School
Neil	T	COA I Staff
Norbury	G	13 Coy RCEME
Owen	LR	7 Coy RCEME
Parker	JC	204 Base Wksp
Patterson	DJ	2 Fd Wksp
Richardson	W	202 Base Wksp
Rivers	AM	3 Coy RCEME
Riley	GA	DEME
Robertson	WG	DEME
Rowe	AW	The RCEME School
Shaw	JE	3 Fd Wksp
Sherman	CG	DEME
Sinclair	L	DEME
Snell	JD	ADE
Spackman	JH	RCSA
Tatham	J	11 Coy RCEME
Thivierge	AJ	ADE
Turner	CM	ADE
Turner	K	ADE
Walsh	IS	ADE
Warren	DH	202 Base Wksp

Class 1

Weston	ET	4 Fd Wksp
Wilkinson	EJ	202 Base Wksp
Young	RD	16 Coy RCEME

Class 2

Adams	RMJ	204 Base Wksp
Allen	EB	10 Coy RCEME
Allen	WG	18 Coy RCEME
Almey	B	DEME
Ambler	J	2 Fd Wksp
Anderson	JS	202 Base Wksp
Anderson	SB	1 Fd Wksp
Armstrong	JH	ADE
Axford	DS	DEME
Bailey	E	204 Base Wksp
Balmer	AJ	5 Coy RCEME
Barrey	WGA	202 Base Wksp
Boisvert	L	5 Coy RCEME
Both	TA	6 Coy RCEME
Bottle	DA	2 CIBG LAD
Bouchard	JM	The RCEME Schoo
Bougie	I	202 Base Wksp
Bovey	ET	3 CIBG LAD
Brooks	LF	8 Coy RCEME
Broomer	TF	4 Coy RCEME
Brown	AW	3 Coy RCEME
Burgess	EW	3 CIBG LAD
Burnett	JH	4 Fd Wksp
Campbell	DN	The RCEME Schoo
Cassidy	GP	The RCEME Schoo
Celli	AJ	202 Base Wksp
Chisholm	LF	6 Coy RCEME
Christensen	AJ	204 Base Wksp
Clarke	DC	13 Coy RCEME
Clyde	KT	204 Base Wksp
Cochrane	HM	DEME
Coles	AR	3 Coy RCEME
Colson	AR	3 Coy RCEME
Coughlin	AF	2 Fd Wksp
Crane	CE	The RCEME School
Cross	FT	204 Base Wksp
Cunningham	JM	56 Cdn Inf Wksp
Dainty	HW	8 Coy RCEME
Dance	GN	The RCEME School
Dand	RJM	13 Coy RCEME
Davis	FAE	11 Coy RCEME
Davis	WE	The RCEME School
Deans	AG	202 Base Wksp
Dew	AE	10 Coy RCEME
Dewar	J	DEME
Doherty	E	202 Base Wksp
Doherty	SF	202 Base Wksp
Dorey	EE	RCD LAD
Dormer	NH	202 Base Wksp
Drake	EA	6 Coy RCEME
Drew	CV	ADE
Drobot	W	56 Cdn Inf Wksp
Duncan	FP	1 CIBG LAD
Evans	RL	12 Coy RCEME
Fairbairn	TM	10 Coy RCEME
Feller	DH	4 Coy RCEME
Ferguson	HG	3 Coy RCEME
Foley	HEF	3 RCHA LAD
Ford	RC	1 CIBG LAD
Fryer	JWA	7 Coy RCEME
Gavriloff	W	CADEE
George	AG	4 Coy RCEME

George	LJ	2 CIBG LAD
Gibbs	BF	3 Fd Wksp
Gill	DE	DEME
Given	RJ	204 Base Wksp
Goss	RB	1 RCHA LAD
Graham	AA	13 Coy RCEME
Graham	JC	3 Coy RCEME
Gribble	DL	3 Coy RCEME
Griffin	GW	3 Coy RCEME
Halliday	AG	202 Base Wksp
Hammond	GT	ADE
Hanash	J	2 Fd Wksp
Hardy	JR	3 Fd Wksp
Harper	JM	The RCEME School
Healy	TW	202 Base Wksp
Henderson	KW	4 Fd Wksp
Hewison	RW	4 CIBG
Hicks	AL	6 Coy RCEME
Hinton	WG	The RCEME School
Hirsch	AL	56 Cdn Inf Wksp
Hooper	TC	10 Coy RCEME
Hutley	HA	14 Coy RCEME
Isaac	AW	12 Coy RCEME
Jackson	AF	C&D Estb AHQ
Janssen	MEJ	202 Base Wksp
Johnson	GM	3 CIBG LAD
Johnson	WA	7 Coy RCEME
Johnstone	T	204 Base Wksp
Joyner	EF	CADEE
Kayne	HG	4 Fd Wksp
Keating	EA	3 Fd Wksp
Kelly	MP	16 Coy RCEME
Keogan	MJ	1 Fd Wksp
Kirkpatrick	AM	2 Fd Wksp
Kraemer	KE	The RCEME School
Lasuta	W	8 Cdn H LAD
Lauret	JE	1 Fd Wksp
Lawrence	BJ	4 CIBG LAD
Lee	KA	8 Coy RCEME
Legg	FG	2 Fd Wksp
Leon	GR	1 Fd Wksp
Lewis	CB	202 Base Wksp
Lindsay	GA	204 Base Wksp
Little	JE	202 Base Wksp
Low	GA	202 Base Wksp
MacDonald	CW	10 Coy RCEME
Macklaine	WB	1 Fd Wksp
MacLellan	EB	202 Base Wksp
MacLeod	D	DEME
MacPhee	DM	202 Base Wksp
Mahood	NEH	Incr 'D' 1 RCHA
Main	T	1 Fd Wksp
Mallett	JG	202 Base Wksp
Marston	CV	HQ RCEME Wescom
Mason	J	2 Fd Wksp
Maw	A	204 Base Wksp
Maxwell	AC	11 Coy RCEME
McBlane	AG	Alta Area I Staff
McCaffrey	LE	2 Fd Wksp
McCormack	CB	3 Fd Wksp
McDonell	AF	4 Fd Wksp
McDow	KA	2 CIBG LAD
McElroy	JC	3 Fd Wksp
McGovern	PMJ	DDD
McIntyre	WA	2 Fd Wksp
McLeod	HAT	The RCEME School
McLeod	LF	HQ RCEME Eascom
McLeod	MH	DEME
Melvin	GR	4 Fd Wksp
Milne	HC	202 Base Wksp
Molnar	LA	DEME
Moore	WE	DEME
Myatt	WC	4 Fd Wksp
Myrtle	PG	1 Coy RCEME
Nelson	EC	COA I Staff
Newberry	RJ	202 Base Wksp
Nicolson	A	10 Coy RCEME
Oakes	GAM	DEME
O'Grady	CL	4 CIBG LAD
Patterson	MP	204 Base Wksp
Peacock	GG	DEME
Pennie	FM	11 Coy RCEME
Perrin	WG	202 Base Wksp
Pineo	MC	11 Coy RCEME
Press	J	CADEE
Price	EC	3 Fd Wksp
Proud	VS	204 Base Wksp
Rawling	GW	D Pers
Reimer	JJ	13 Coy RCEME
Reynolds	GA	4 Coy RCEME
Rhodes	AP	204 Base Wksp
Robertson	DW	3 Fd Wksp
Roche	WD	202 Base Wksp
Rodd	FL	4 RCHA LAD
Russell	MM	13 Coy RCEME
Rutherford	FA	DEME
Sambrook	JV	DEME
Schleihauf	GH	C&D Estb
Sedger	CA	11 Coy RCEME
Seeley	HR	HQ RCEME Cencom
Seguin	RH	4 Fd Wksp
Silzer	J	7 Coy RCEME
Simpson	WG	2 Coy RCEME
Smith	GE	3 Coy RCEME
Smith	GW	13 Coy RCEME
Smith	J	202 Base Wksp
Smyth	WC	204 Base Wksp
Sochasky	CN	C&D Estb
St Pierre	G	The RCEME School
Stever	JD	202 Base Wksp
Stewart	RH	204 Base Wksp
Stirton	J	204 Base Wksp
Storbo	RM	11 Coy RCEME
Stringer	AJ	Man Area I Staff
Szumlanski	J	FGH LAD
Taylor	JF	12 Coy RCEME
Taylor	HE	3 Fd Wksp
Taylor	RT	The RCEME School
Thomas	GA	RCSA LAD
Toms	FA	202 Base Wksp
Walker	J	202 Base Wksp
Warmington	JW	3 Coy RCEME
Weaver	CR	1 Fd Wksp
Wild	EB	LdSH(RC) LAD
Wilson	RR	1 CIBG LAD
Wright	EO	The RCEME School
Young	RJ	11 Coy RCEME